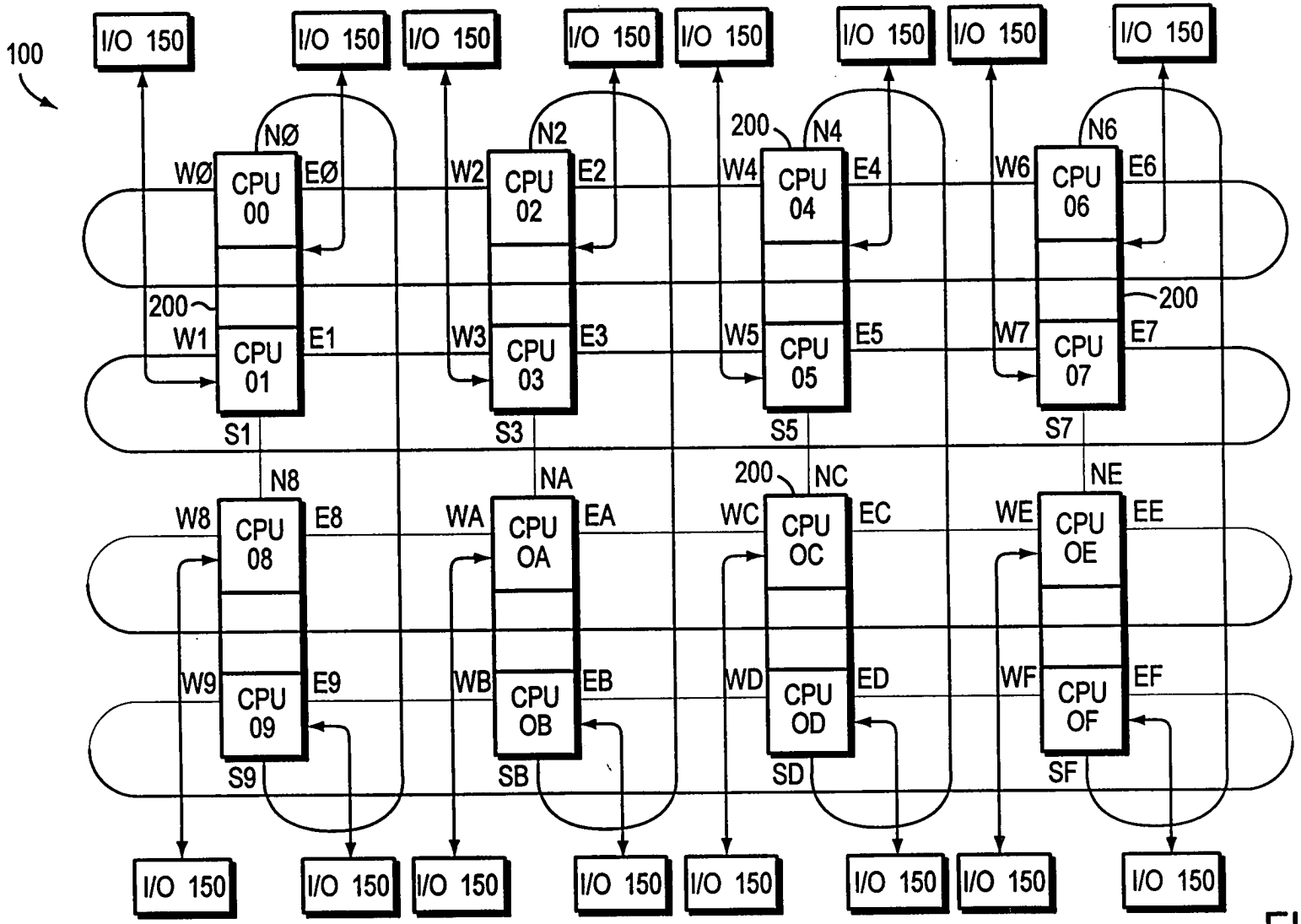


FIG. 1

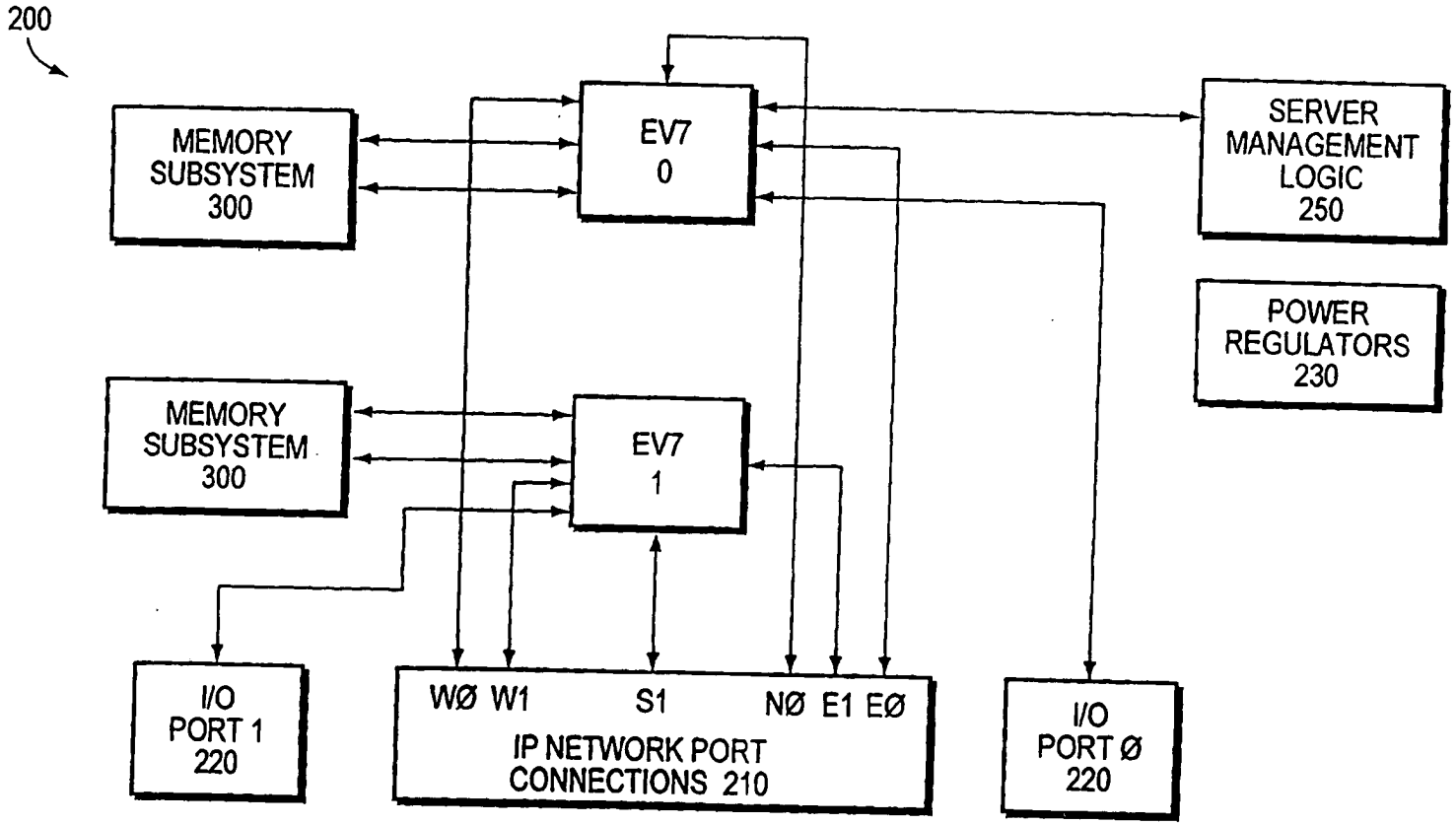


FIG. 2

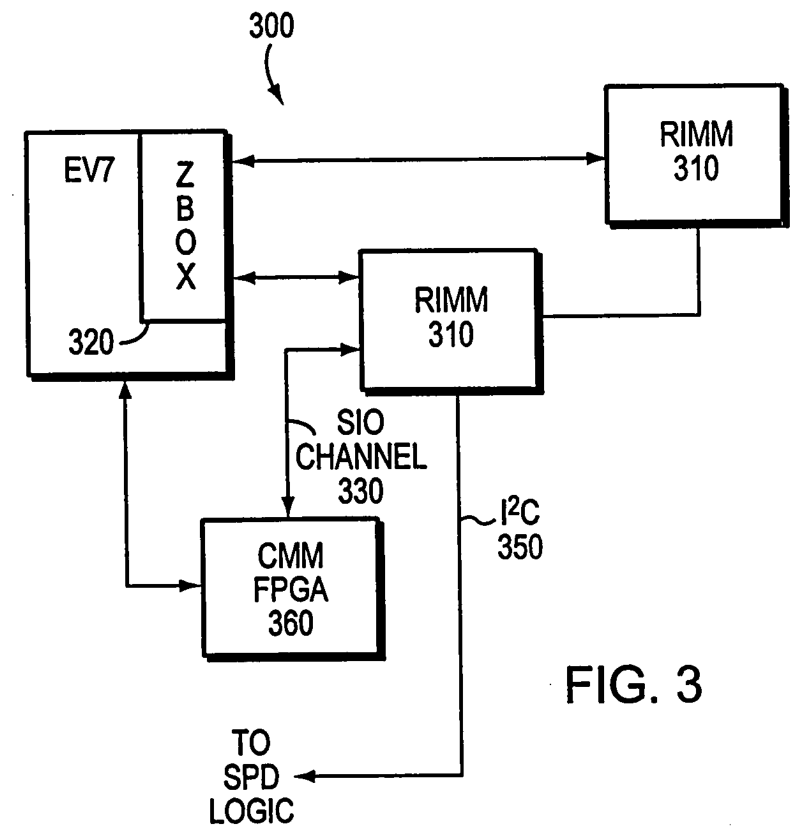


FIG. 3

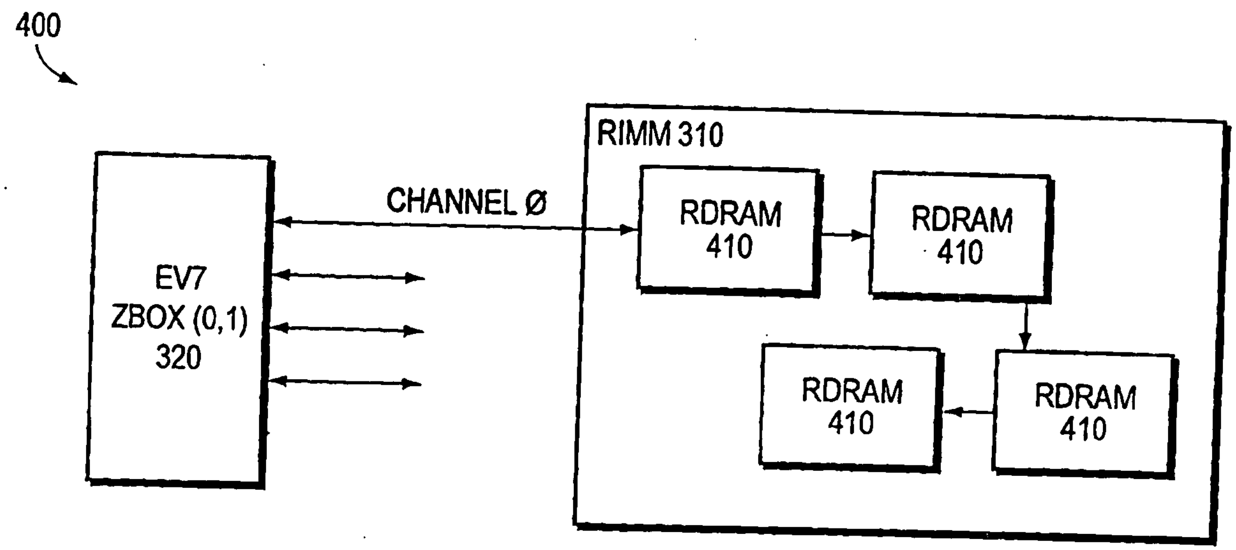


FIG. 4

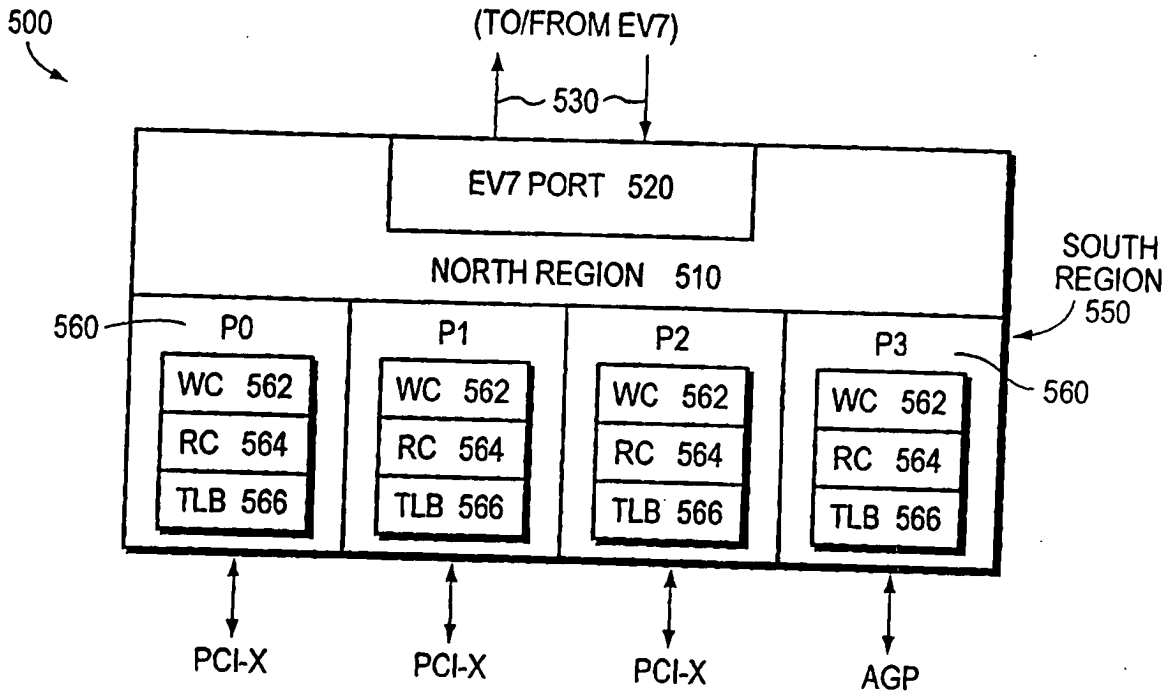


FIG. 5

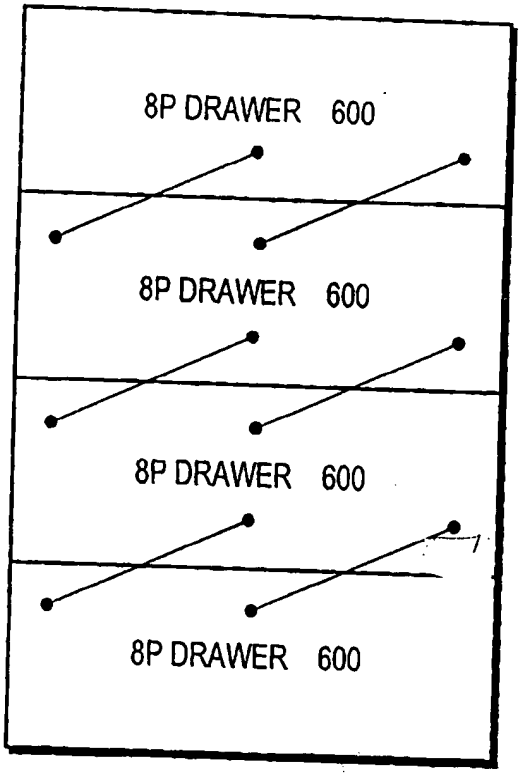


FIG. 6

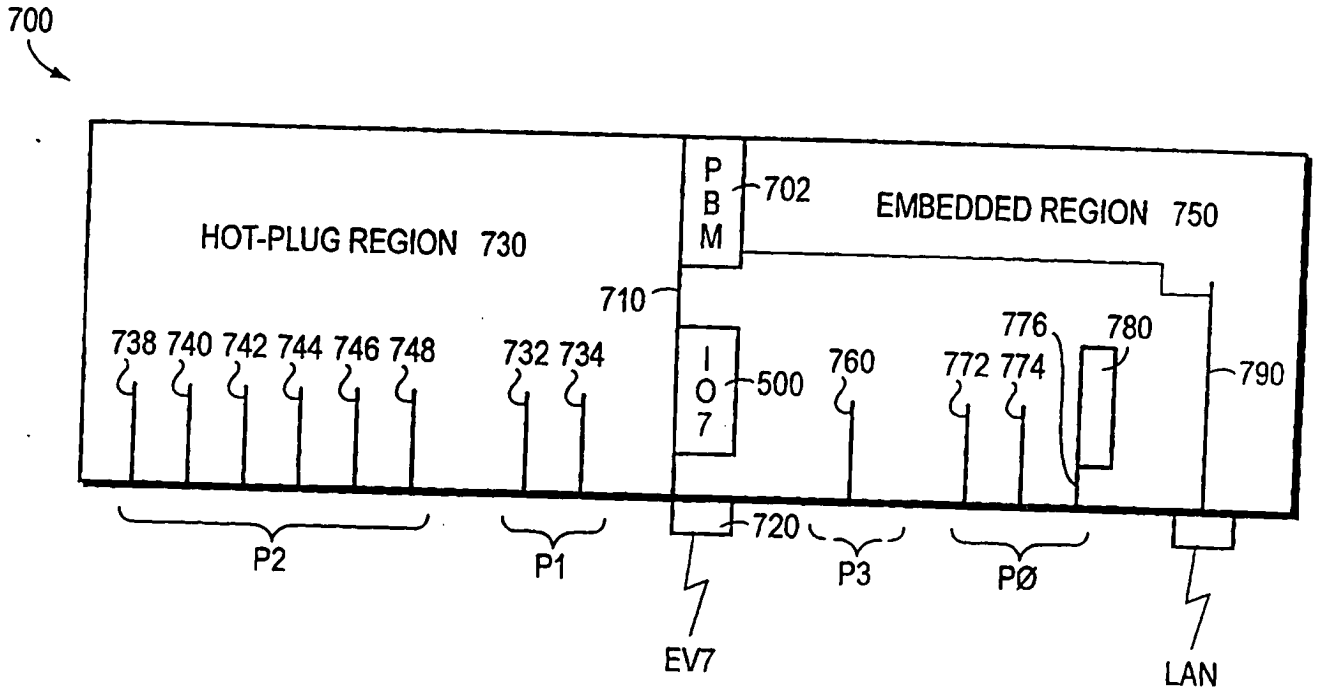
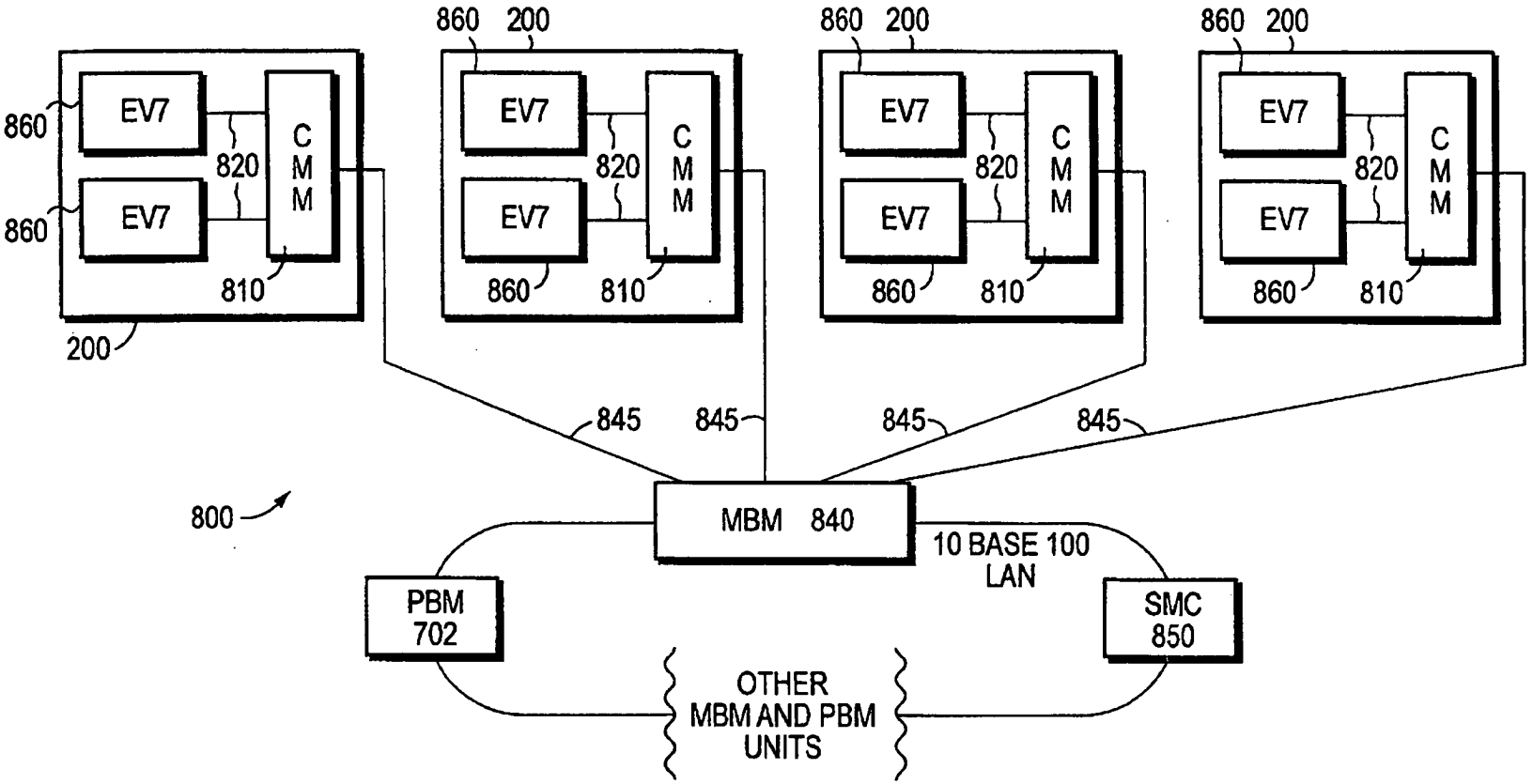


FIG. 7


860
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M
EV7
860
810
845
845
845
845
800
MBM 840
10 BASE 100
LAN
PBM
702
SMC
850
OTHER
MBM AND PBM
UNITS

FIG. 8

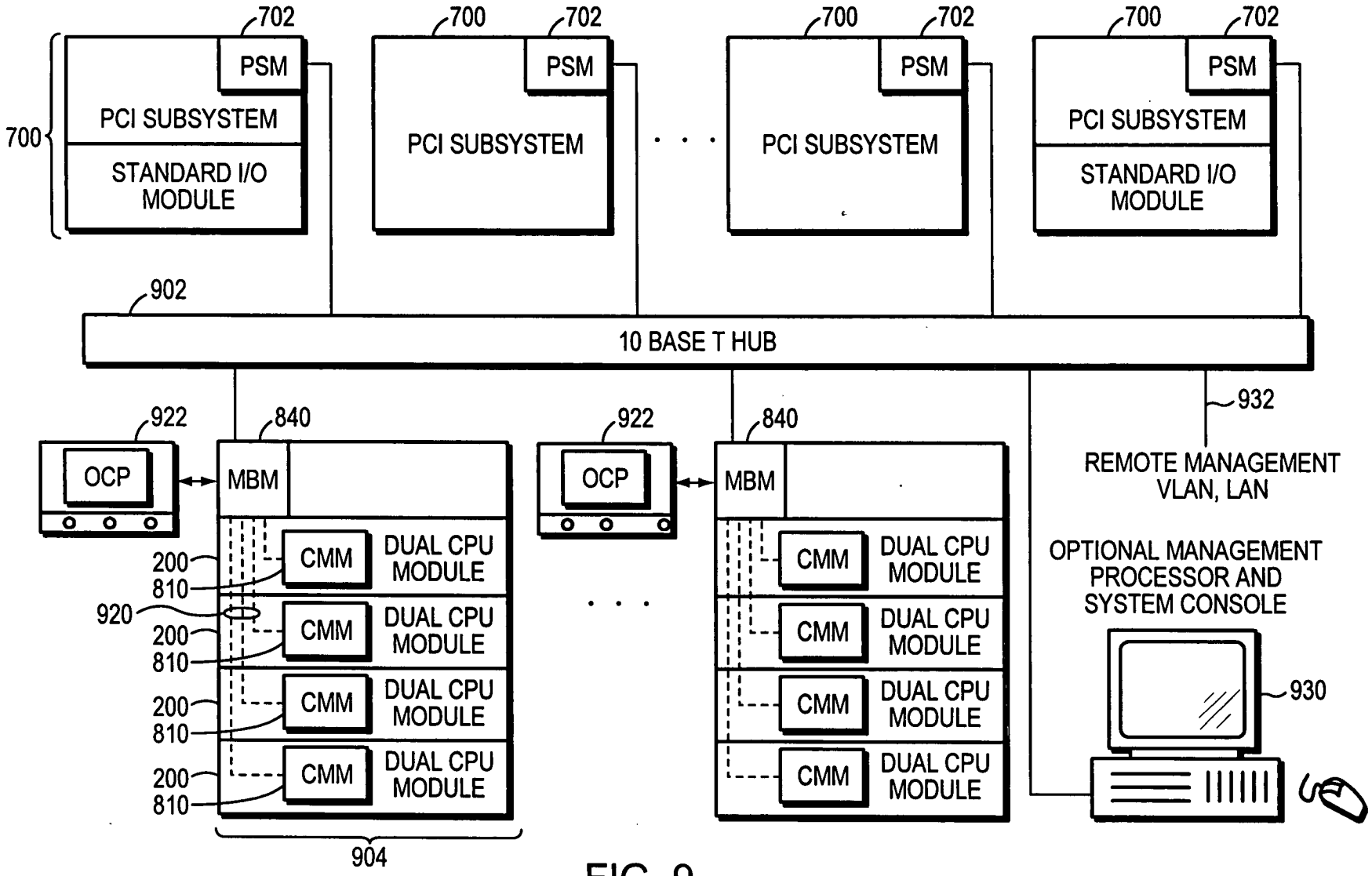


FIG. 9

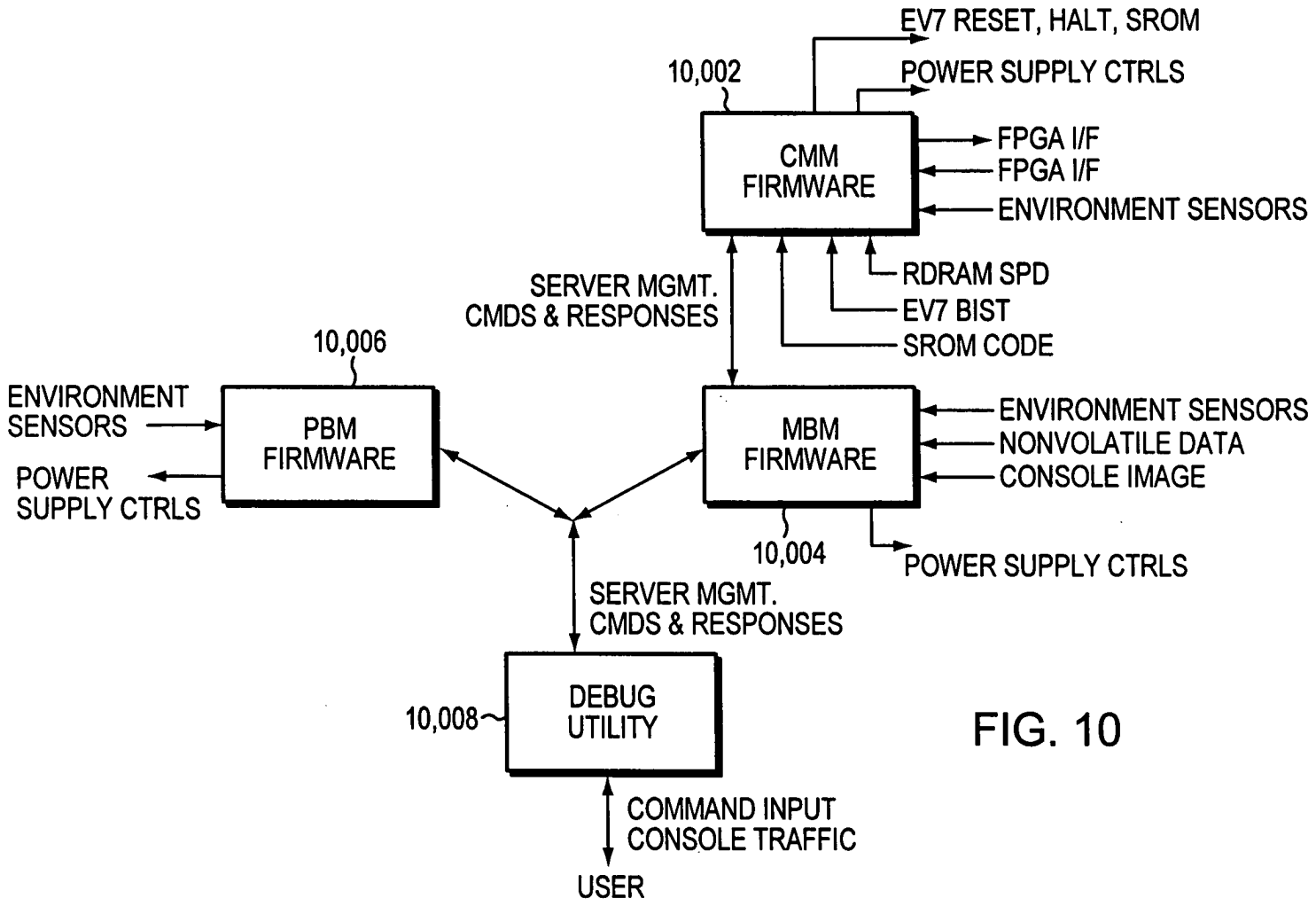


FIG. 10

Command	*Description*
connect	Connect a virtual console session to an SRM Firmware instance
disconnect	Disconnect a virtual console session from an SRM Firmware instance
power {off, on} *item*	Change the power state of an item (CPU, 8P unit, I/O Drawer)
halt *processor*	Issue a HALT to an EV7 processor (specified by processor ID)
reset *[partition]*	Issue a system reset or a reset to the specified partition
reset *processor*	Issue a Reset to an EV7 processor (specified by processor ID)
reset { CMM, MBM, PBM}	Issue a Reset to one of the Server Management processors
set manufacturing	Set serial number, other FRU data
set partition	Define the number of partitions, assign partitionable resources to each partition, define the partition permissions.
show config	Show the entire system configuration
show CPU *{processor}*	Show data on an EV7 CPU (specified by processor ID) or all CPUs
show LAN	Show the nodes on the Server Management LAN
show memory	Show information on memory configuration
show partitions	Show the defined partition data
show FRU	Show the FRU data for the system FRUs
show power	Show the thermal and voltage sensor data
show error	Show the non-volatile saved error state
clear error	Clear the non-volatile saved error state
update	Update system firmware
date	Set / show the server management time
examine / deposit	Display / modify memory
test *processor n*	Run the test identified by *n* on the specified *processor* ID
set test signal *processor n*	Assert cable test signal for port n (N, S, E, W, I/O) on the specified *processor* ID and light the cable LED.
clear test signal *processor n*	De-assert cable test signal for port n (N, S, E, W, I/O) on the specified *processor* ID and extinguish the cable LED.
check test signal *processor n*	Test cable test signal for port n (N, S, E, W, I/O) on the specified *processor* ID.

External Server Management Commands

Fig. 11

3

Command	*Description*
PutChar	Send a character to the operator display
GetChar	Get a character from the operator keyboard
SetTermInt	Set operator terminal interrupt setting
Hello	Announce the present of a Server Management member
Poll	Probe for the presence of a specific Server Management member
No-op	No operation, used for testing
SysError *data*	System error state information to be saved
FRUError *id, data*	Store FRU error *data* in the FRU specified by *id*

Internal Server Management Commands

Fig. 12

Cell	*Description*
Seconds	Second count, 0-59, binary format
Minutes	Minute count, 0-59, binary format
Hours	Hour count, 0-23, binary format
Day	Day of the month, 1-31, binary format
Month	Month of the year, 1-12, binary format
Year	Year, 0-99, binary format

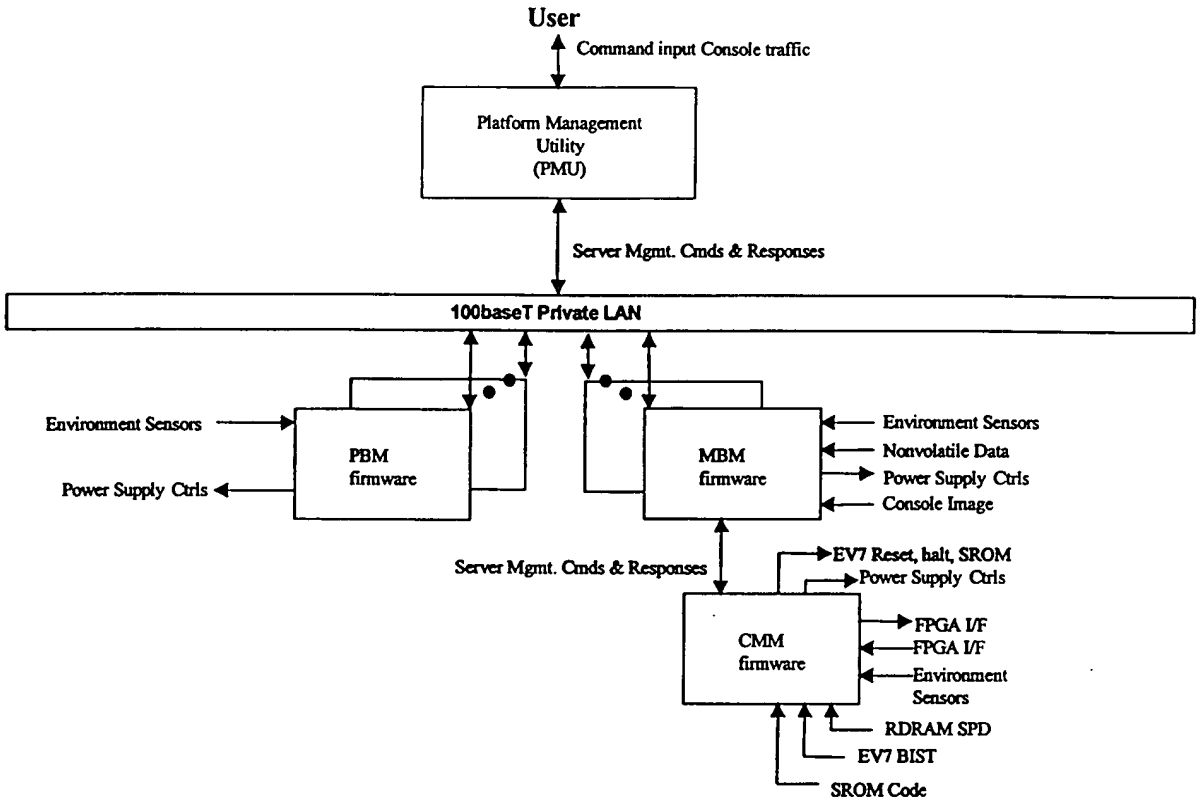
BB_WATCH Data

Fig. 13

Message	*Description*
CSB_READ	Read data element from the PBM
CSB_WRITE	Write data elements to the PBM
CSB_POLL	Obtain PBM status

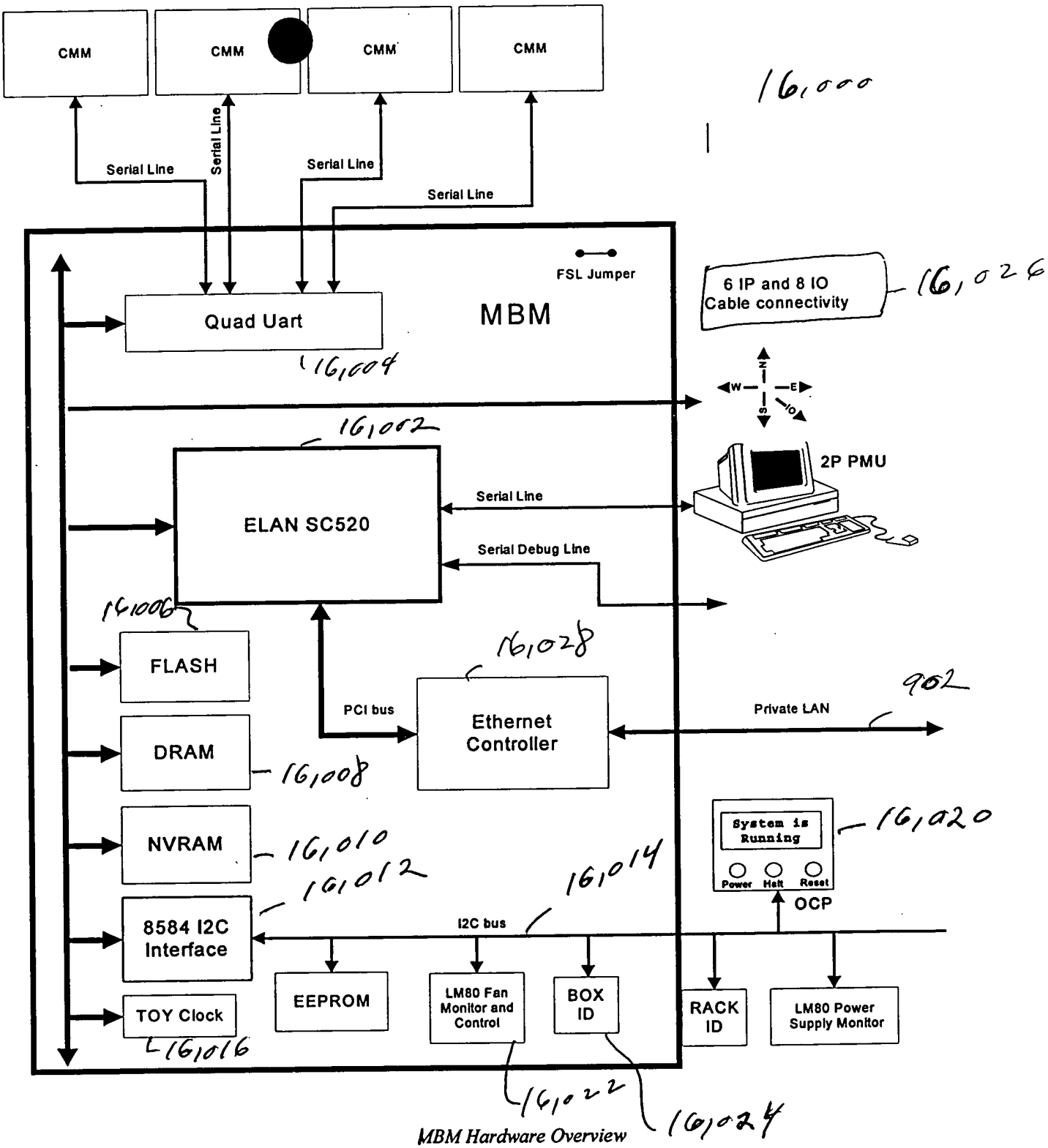
CSB Messages

Fig. 14



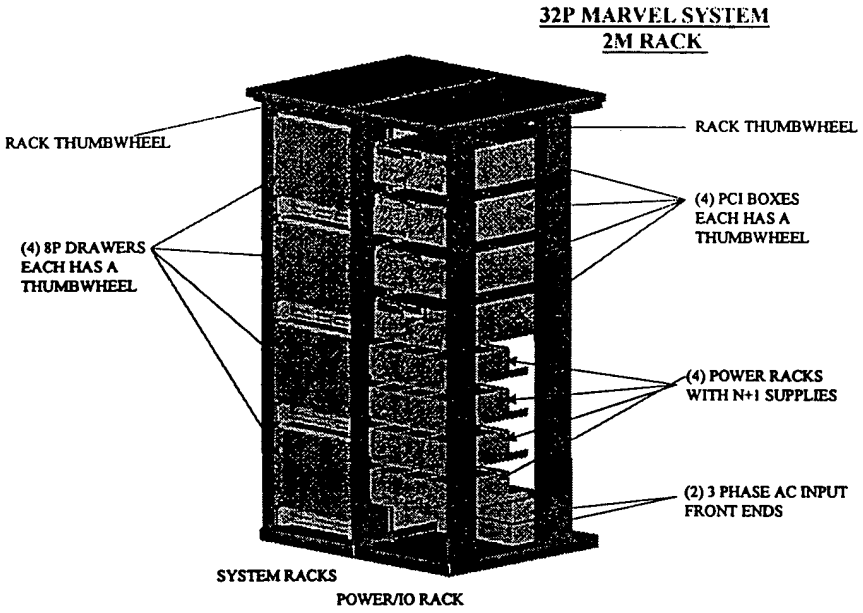
Server Management Hardware Overview

Fig. 15



MBM Hardware Overview

Fig-16



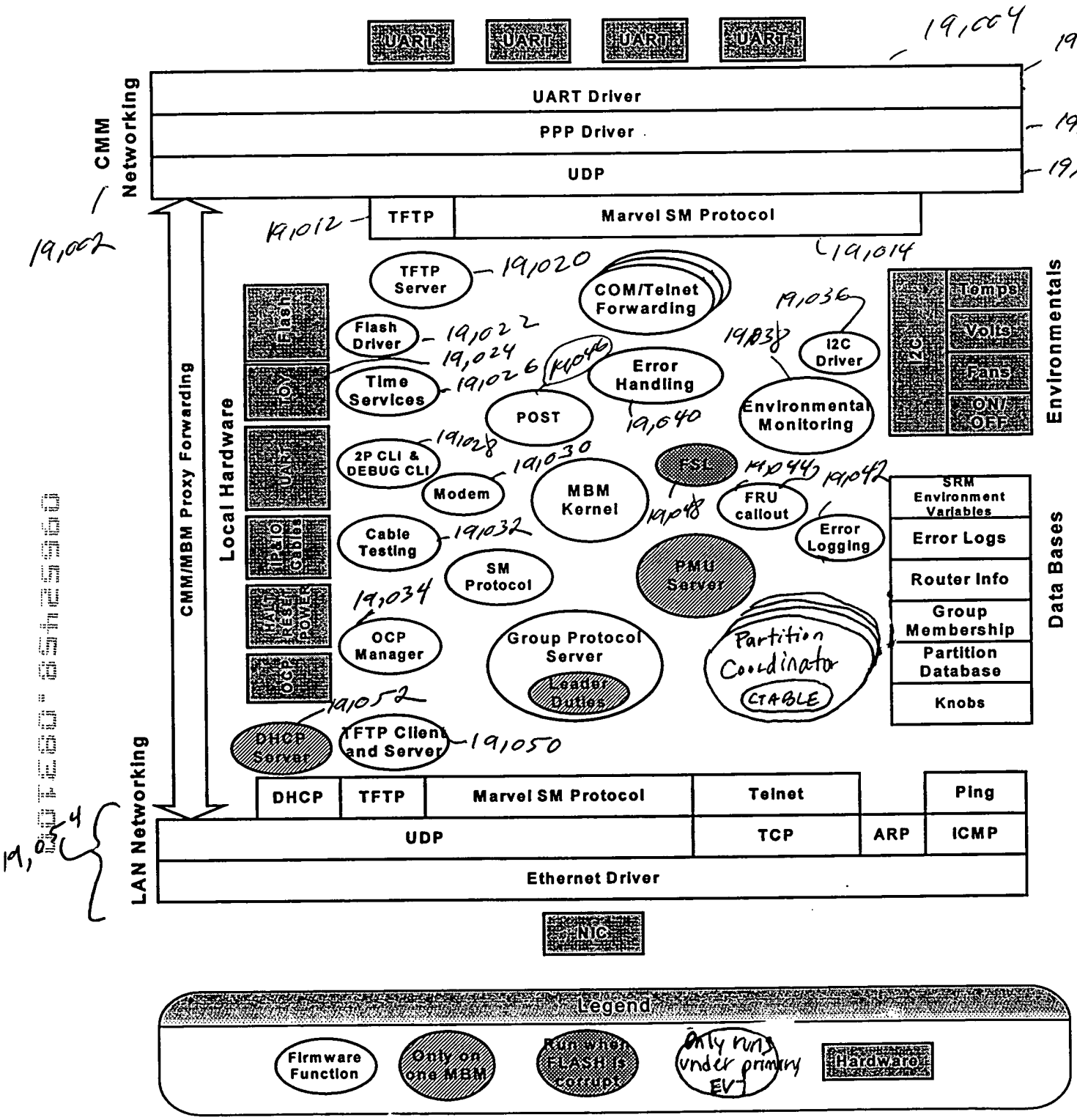
Rack and Box Thumbwheel Scheme

Fig. 17

Task	How Many	Where
Group Leader	1 per Marvel System[1]	Lowest MBM in group
PMU Server	1 per Marvel System[1]	Lowest MBM in group
Partition Coordinator	1 per hard partition; max 8 per MBM	MBM with lowest EV7 in hard partition
Telnet Server	2 per subpartition (COM0,COM1)	Grandparent MBM of primary EV7
DHCP	1 per Marvel System[1]	Lowest MBM in group

MBM Task Attributes

Fig. 18



MBM Firmware Overview

Fig. 19

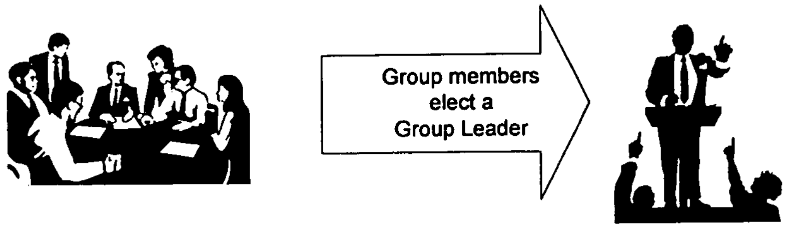


Fig. 20

General Phase	Group Changes	Specific Steps	Notes
Independent Processing	Unaffected	[illegible]ST	
		[illegible]V Poll Status and State	Handle MBM hot swap. Power that is on is left on, power that is off is left off.
Group Formation Majority / Minority Replicated Data Sync	Normal group processing, new group is formed	New Group is initiated. A group forms and a leader is selected.	
		If there was not a previous majority group, then the replicated database is marked invalid.	
		If the new group is a minority, mark the database read-only.	
		If the new group is a majority, request the database and any pending updates from all members who were previously joined to the MaxPrevMajorityGroup.	
		Apply the longest list of updates to the corresponding database copy and send the new initial replicated database to all members. All members mark the database as valid.	
		If the new group is a majority and there was no previous majority group, then clear the powerup_complete flag.	
		If the new group is a majority and the powerup_complete flag is set, then proceed to the Hardware Init phase. Else, proceed to the Operational phase.	Minority groups remain in this phase
Hardware Init	Return to forming a new group and re-run init	Poll CMMs to determine CPU module population details within each 8P backplane. This initializes the list of available resources.	
		The Leader computes a routable configuration for each partition based upon the requested and available CPU resources.	
		The leader decides to power up the partitions. It commands all MBMs, PBMs, and CMMs to power up. Upon completion, the leader obtains the results from each of these commands and adjusts the list of available resources accordingly.	
		The partition coordinators start XSROM testing on all CPUs for memory.	
		The PMU Server initiate IP cable testing between 8P backplanes and IO cable testing between 8P backplanes and I/O crates. The results are used to recalculate routing and assign I/O to partitions.	
		The partition coordinators initiate XSROM tests for I/O and routing. The results are used to recalculate routing and adjust the list of I/O resources.	
		The partition coordinators initiate remote memory testing between CPUs in the same partitions.	
		The partition coordinators initiate interrupt testing between CPUs in the same partitions.	
		The leader sets the powerup_complete flag to true and proceeds to the S/W Load phase.	
S/W Load (SRM + O/S)	New Groups are treated as hot-adds	The partition coordinators elect a primary EV7 in each partition. They command all secondaries to spin on RBOX_SCRATCH and initiate loading of the SRM firmware on the primary.	
		The SRM firmware commands the secondary CPUs to join by writing RBOX_SCRATCH. The primary EV7 completes all I/O initialization.	
		If the SRM auto_action environment variable is set to BOOT, the operating system boot is attempted on the partition.	
Operational	New Groups are treated as hot-adds	Server management requests from the primary EV7 in each partition are handled by the CMMs / MBMs / PBMs.	
		If a new group has caused a change in the CPU, Memory, or I/O resources, notify the primary EV7 in each affected partition.	
		If a new resource has been pre-allocated to a partition, then the partition coordinator takes the steps necessary to probe the IP or IO links to the new resource (CPU or I/O drawer).	

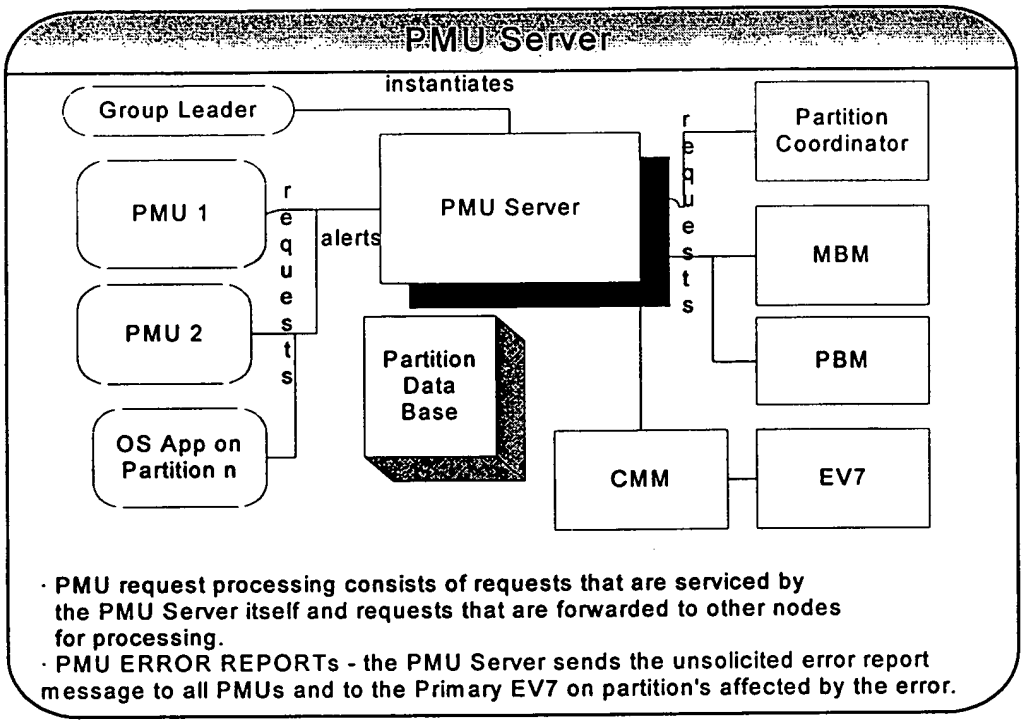
Marvel System Powerup Flow with Group relationship

Fig. 21

Capability	via private LAN	via FPGA
Virtual console terminal access	Yes	No
Firmware updates	Yes	No
Load/Disable Test firmware	Yes	No
Live configuration change [1]	No	Yes
Writing SRM environment vars [2]	No	Yes
Unsolicited notification of alerts	Yes	No
Store PCI Slot information [2]	No	Yes
All others	Yes	Yes

LAN vs FPGA PMU capability matrix

Fig. 22



PMU Server Block Diagram

Fig. 23

Command Group	Commands Received	Class	PMU Server Handling Method
System Discovery	Get MBM / PBM CONFIGURATION	Forward	Commands are forwarded to the MBM or PBM addressed in the message header. Responses are forwarded back to the PMU.
	GET PCI SLOT INFO		
	GET PARTITION DATABASE	Direct	The PMU Server derives the response from his local copy of the Partition Database.
	GET OWN PARTIITION NUMBER		
	GET SYSTEM TOPOLOGY	Direct	The PMU Server keeps track of the applications making this multi phase request until the last entity has been requested. The entity number in the request is used to index into a list composed of the combination of group members and partition database. The IP addresses, parent relationship and partition number is derived from these values found in NVRAM. If the group members or partition database changes before the last entity is requested, an error response is returned on the next request.
	SET PCI SLOT INFO	Forward	The PMU Server must ensure that this request is coming from an EV7 and not from the PMU on the LAN. These packets are directed to the PBM associated with the slot.
Partition Control	ALL COMMANDS OF GROUP	Forward	All commands in this group that contain a partition number are forwarded to the MBM running the appropriate partition coordinator. The exceptions are Read State of OCP switches, OCP Switch assignment and Power On/Off commands that are simply forwarded to their destination.
EV7 Setup	REQUEST EV7 START TEST	Forward	This command is forwarded to the destination EV7.
Cable Test Group	GET CABLING CONFIGURATION	Direct	The PMU Server responds with the contents of the Cable Database that he composed during Initialization or was requested via Reconfigure Cabling.
	RETEST CABLE CONFIGURATION	Complex	The PMU Server re-initiates the test of all IP and IO cabling making use of the commands Get MBM IP Cabling and Get PBM IP Cabling.
	SET CABLE TEST SIGNAL	Complex	The PMU Server ensures that there are no other on-going cabling requests and forwards these commands to the PBM or MBM in the destination field and returns the response to the PMU.
	GET CABLE TEST SIGNAL		
Virtual Console	GET TELNET IP ADDRESS/PORT	Direct	PMU Server determines the primary MBM's IP Address and the socket port.
Firmware Load and Upgrade, Environmental Retrieval, FRU Data, Error Logging, Miscellaneous		Forward	All commands in these groups are forwarded to the CMM, PBM or MBM in the destination field and the response returned to the PMU.
Date/Time		Forward Direct	The PMU Server allows Base Time Gets and Sets from all PMUs but Delta Time Sets and Gets can only come from Partition Primary EV7s. The requests are forwarded to the MBM being addressed.
Miscellaneous	GET/SET KNOB READ/WRITE BLOCK DATA	Forward	These requests are forwarded to the destination for processing.

PMU Server Received Comand Handling

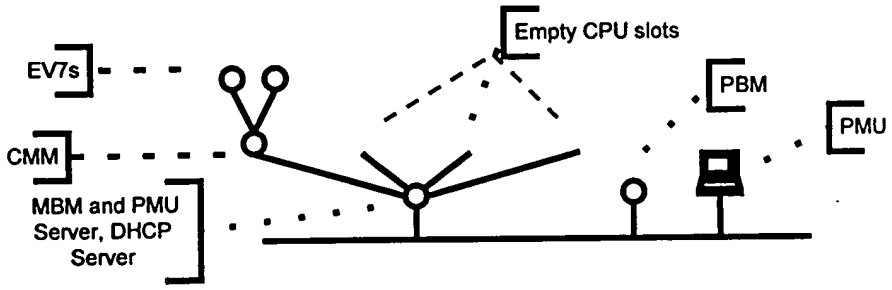
Fig. 24

Command Group	Commands Received	PMU Server Handling Method
System Discovery	Get MBM/PBM CONFIGURATION	
	GET PARTITION DATABASE	
Cable Testing	SEND CABLE ID RECEIVE CABLE ID GET MBM IP CABLING GET PBM IP CABLING	These commands are issued in response to a RETEST CABLE CONFIGURATION request. The process is discussed in section Error! Reference source not found., Error! Reference source not found.
Error Logging Group	ERROR REPORTING	The PMU Server knows the IP address of client PMUs and distributes the alerts to each PMU.
Miscellaneous	DISTRIBUTE DHCP LEASE DATA	The DHCP server runs on the PMU Server and keeps track of the DHCP clients. For failover purposes, this data is replicated on all nodes. See section Error! Reference source not found. Error! Bookmark not defined..

PMU Server Originating Commands

Fig. 25

Show Configuration



Marvel System Configuration used in this example

Fig. 26

PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	The PMU's PC connects to the LAN and requests an IP address
PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	The MBM is running a DHCP server and provide it a lease on a DHCP address.
PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	The PMU application when initializing issues the **GET SYSTEM TOPOLOGY** command starting at 0. The command is issued to th PMU Server which is a predetermined address
PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	Entity 0, the data for the MBM is returned.
PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	PMU sends a **GET MBM CONFIGURATION** to the MBM and picks up information, like the RIMM population.
PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	The PMU Server task forwards the command to the MBM SM protocol servicing task. It returns information on the CPUs that is has gathered previously.
PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	The PMU issues the **GET SYSTEM TOPOLOGY** for entity 1
PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	Entity 1, the CMM, is returned.

Show Config Flow Diagram (Part 1)

Fig. 27

PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	The PMU issues the **GET SYSTEM TOPOLOGY** for ntity 2
PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	Entity 2, the data for the EV7-0 is returned.
PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	The PMU issues the **GET SYSTEM TOPOLOGY** for entity 3
PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	Entity 3, the data for the EV7-1 is returned.
PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	The PMU issues the **GET SYSTEM TOPOLOGY** for entity 4
PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	Entity 4, the data for the PBM is returned.
PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	The PMU issues a **GET MBM IP CABLING** to the PMU Server
PMU	MBM PMU Server DHCP Server	CMM	EV70	EV71	PBM	IP Cabling data is returned

Show Configuration Flow Diagram (Part 2)

Fig. 28

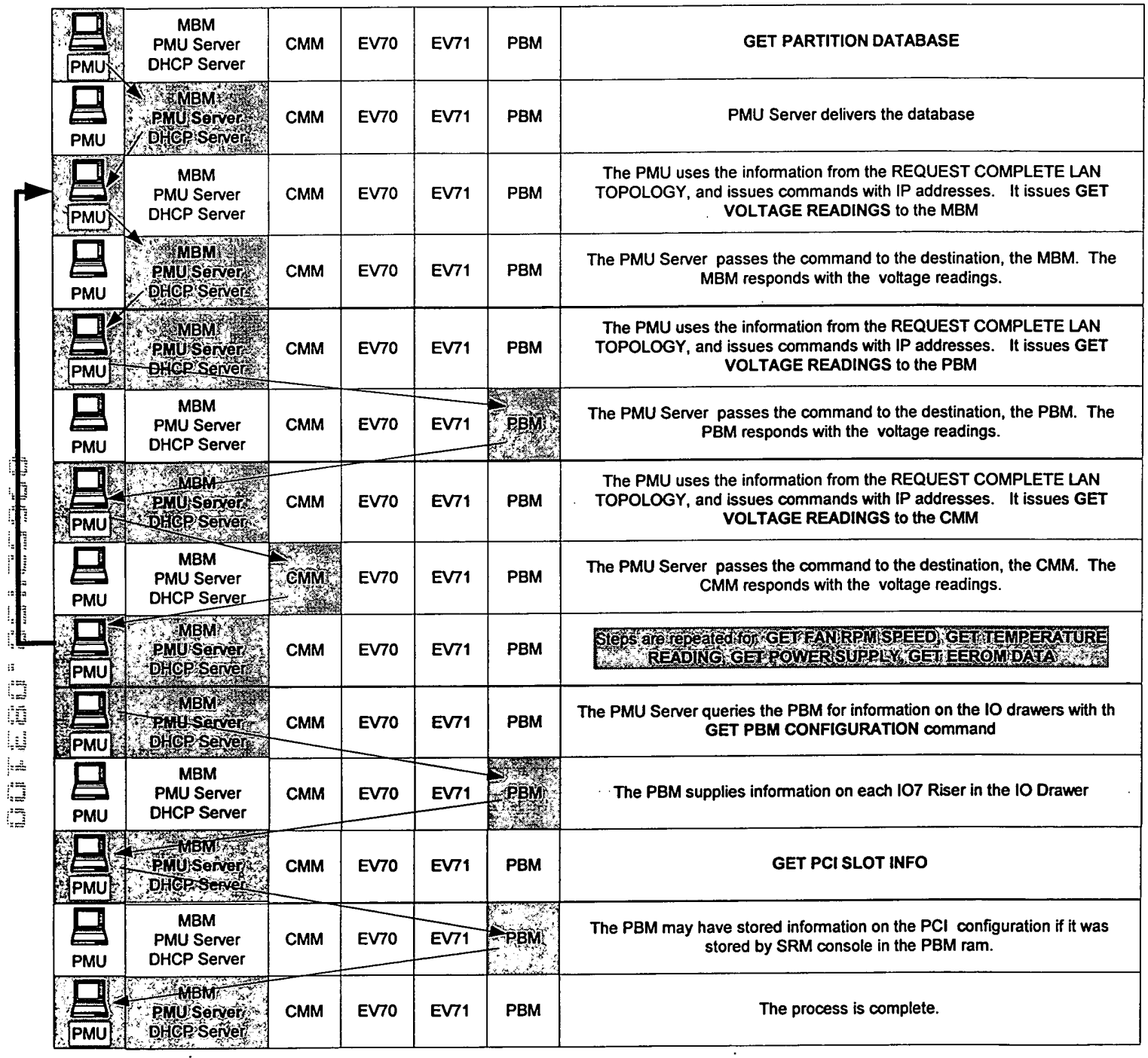
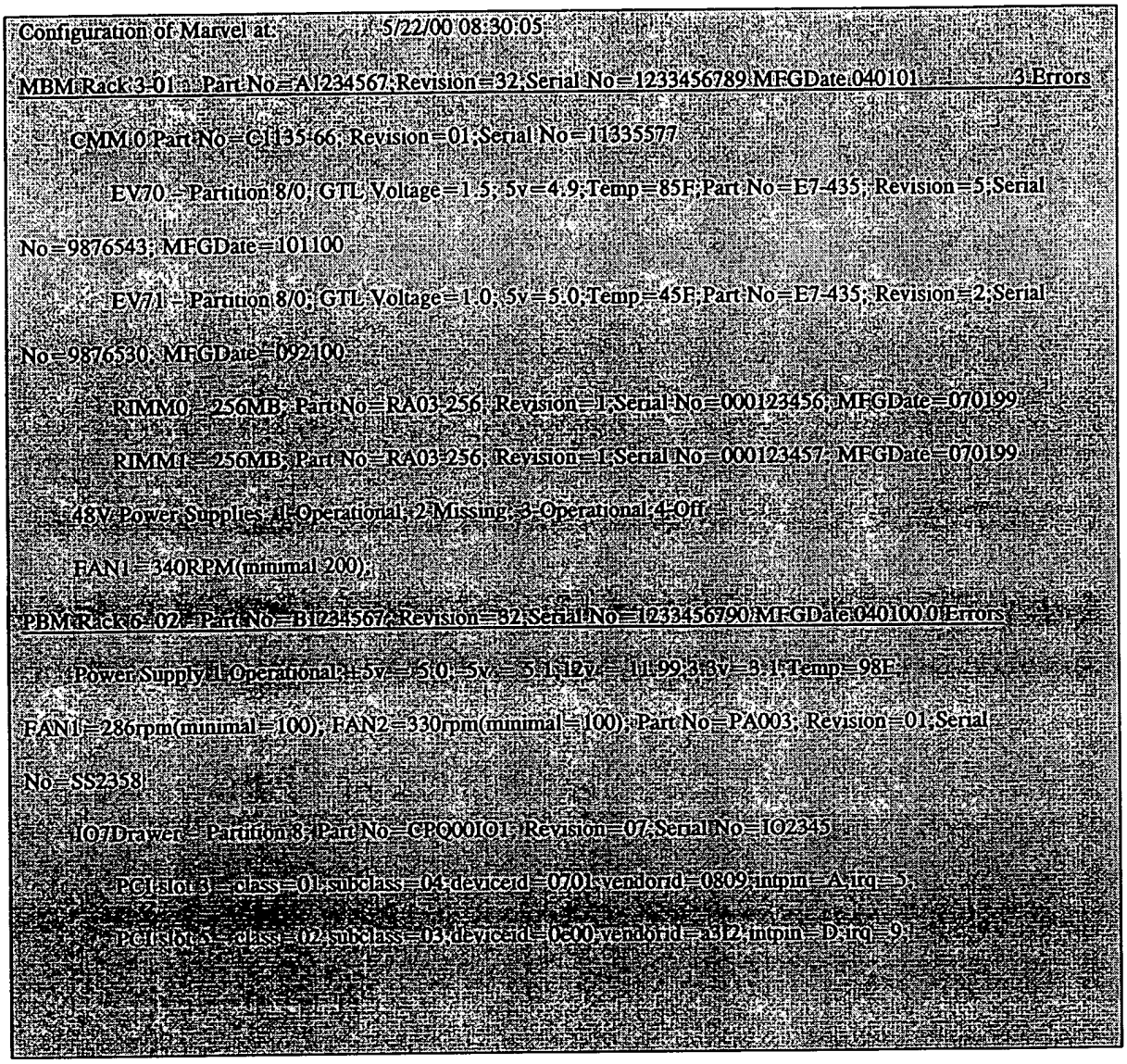
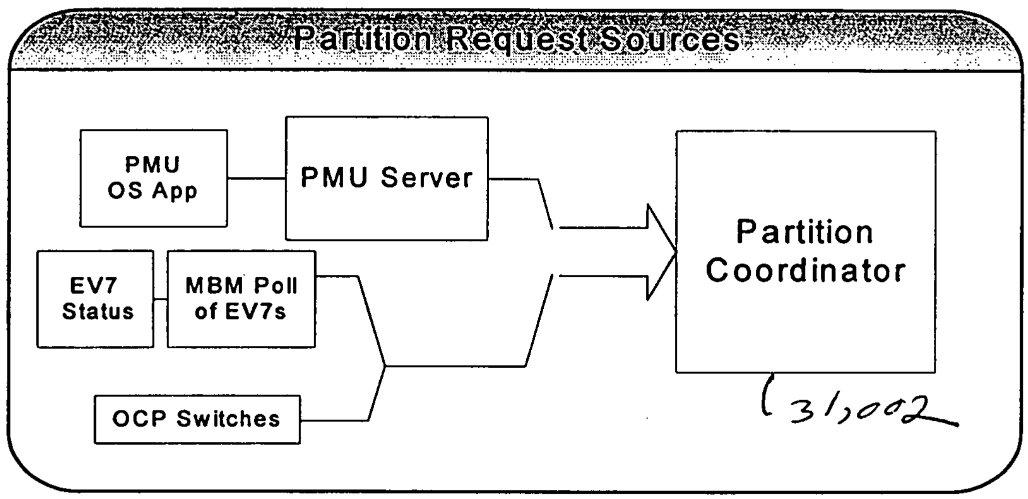


Fig. 29 Show Configuration Flow Diagram (Part 3)



Show Config Sample Output

Fig. 30



Partition Request Sources

Fig-31

Requests Received	Class	Partition States	Handling Methods	Reference Flow
Move EV7s to Partition Remove EV7s from Partition	Complex	Running OS	Check the proper cabling of a newly formed hard partition or additions to an existing partition. Determine memory and routability. Distribute the requests on the TRAIN to update volatile Databases.	
Assign Memory or IO to Sub Partition	Trained			
Set Partition State Attributes	Trained			
Switch Primary EV7	Complex	Partition Running OS	Distribute the requests on the TRAIN to update volatile Database.	
Assign Sub Partitions	Trained			
Assign Memory or IO to Sub-partition	Trained			
Add EV7or Delete EV7 to/from Running Partition	Complex	Partition Running OS	Cable testing is performed to determine proper connections ; A Quiesce request is made to all EV7s in the partition; new Rconfig/Cconfig requests are sent to all EV7s and if acceptable Continue is sent to the EV7s. If an error is found in routing new Rconfig/Cconfig computations are attempted and sent to the affected EV7s.	Figure 16
Save Partition Assignment	Trained	Don't Care	Send the save command on the train so that all copies of volatile database for the partition can be copied to non-volatile.	Figure 9
Reset Partition	Complex	Partition Reset in Progress or Partition running OS	Pulse Reset on all EV7s in partition, Reload SROM, XSROM on all EV7s, reconfigure Routing, send Rconfig/Cconfig to all EV7s and if no errors, Load SRM to primary.	Figure *11*
		Partition Powered Off	Return Error	
Power Off Partition	Complex	Partition Reset in Progress or Partition running OS	If Dual EV7 in partition or EV7 in free pool, send Power Off EV7s to each such CMM in partition. Power off PCI Drawer on PBMs that have all IO7 risers in partition. If power is off for all CMMs in a cabinet of MBMs, power off the power supplies in the cabinet.	
		Partition Powered Off or request made to sub partition	Return Error	
Power On Partition	Complex	Partition Reset in Progress or Partition running OS	Return Error	
		Partition Powered Off	Turn Power on to any Power Supplies that are off and under control of Cabinets that have EV7s assigned to our partition. Power up PCI drawers for PBMs that have IO7s in our partition. Power up Dual EV7s on CMMs that have EV7s in our partition. Continue like the reset process.	
Halt Partition	Forwarded	Partition Reset in Progress or Partition running OS	Send Halt On to primary Ev7 of partition.	
		Partition in Halt State or Partition Power off	Return Error	
Disable Halt Partition	Forwarded	Partition Reset in Progress or Partition running OS	Return Error	
		Partition in Halt State or Partition Power off	Send Halt Off to primary Ev7 of partition	
Store Environment Variables	Trained	Partition running OS	This causes a distribution of the SRM environment variables to all peers	Figure 34
Get Environment Variables	Direct	Partition running OS	Return local copy of all SRM environment variables	

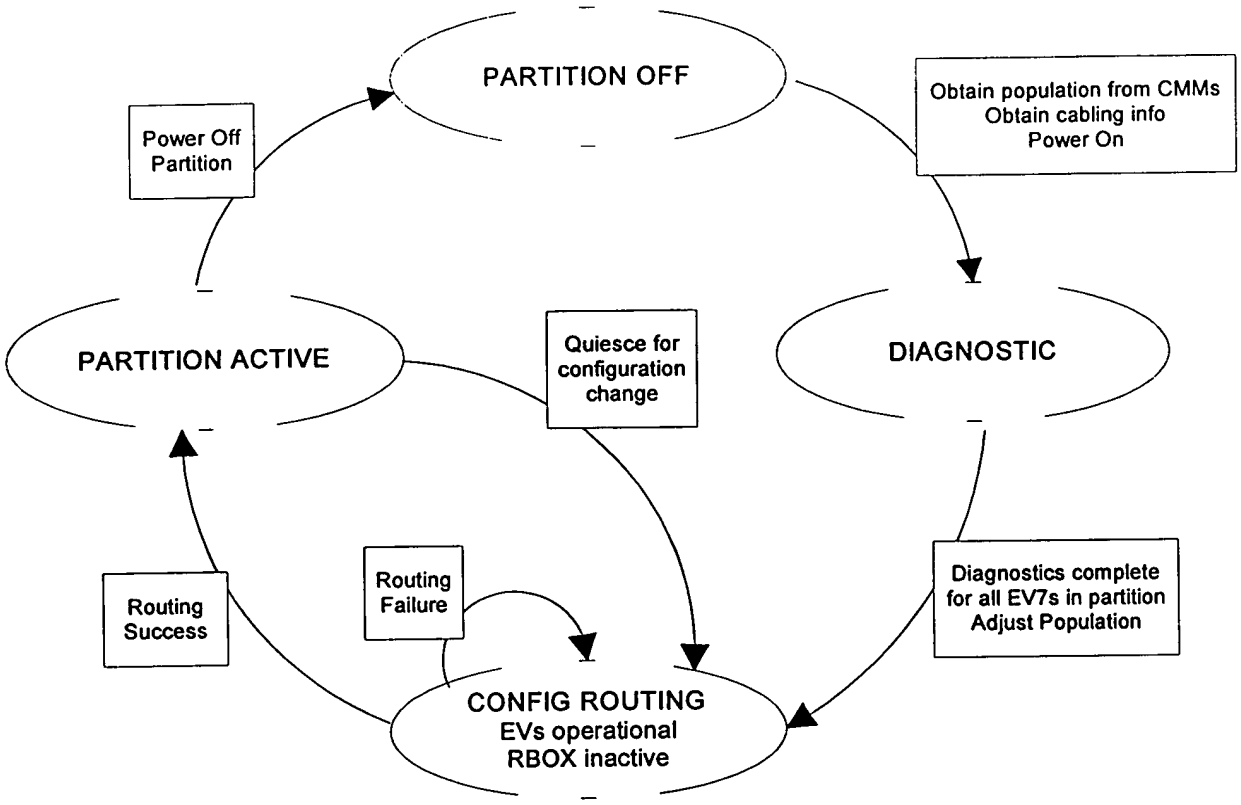
Partition Coordinator Handling of Requests

Fig. 32

Commands Issued	Partition States	Handling Methods	Reference Flow
Train Full	Any		
EV7 Quiesce	Partition Reset in Progress	CMM facilitates	Figure 17, Figure 20
Config Rbox/Cbox	Partition Reset in Progress	CMM facilitates	Figure 17,Figure 20
EV7 Reset	Any	CMM facilitates	Figure 15
EV7 Start Test	Partition Reset in Progress	CMM facilitates	Figure 16, Figure 18
EV7 Halt	Any	CMM facilitates	
Load Image	Partition Reset in Progress	CMM facilitates	Figure *15*, Figure 20
Set Partition State	Partition Reset in Progress	CMM facilitates	Figure *15*, Figure 16, Figure 17, Figure 18, Figure 20, Figure 21
Power On/Off	Any	CMM, MBM, and PBM facilitates	

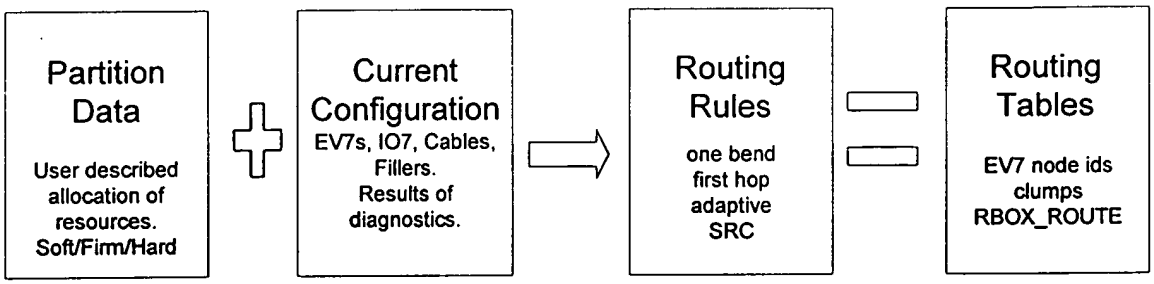
Partition Coordinator Commands Issued

Fig. 33



Partition State Diagram

Fig. 34



Inputs and Outputs of Router algorithm

Fig. 35

Routing Glossary

Primary dimension: one of EAST-WEST or NORTH-SOUTH. This choice is the same for all EV7s.

Secondary dimension: the other way.

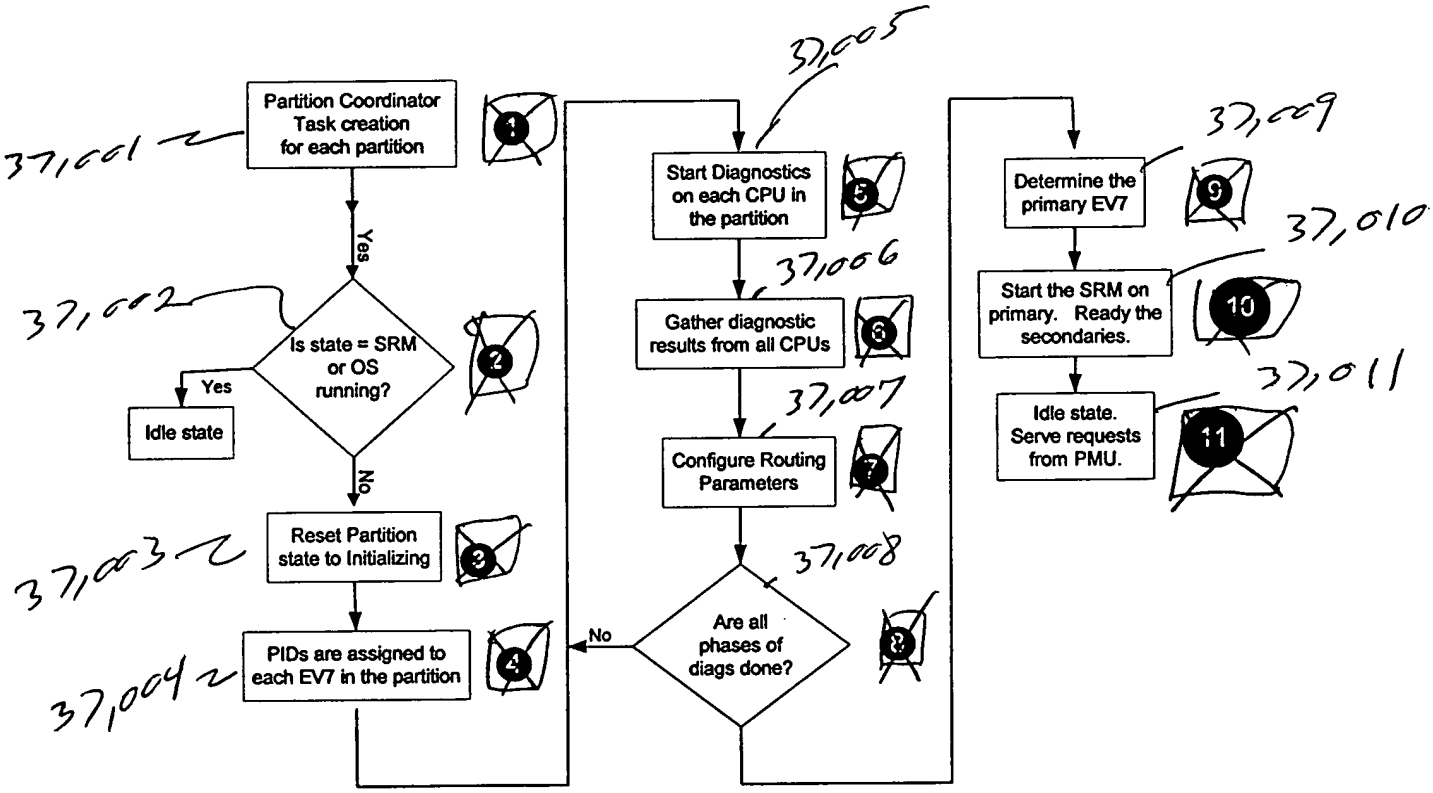
Dimension-order routing: the shortest path connecting two nodes which proceeds first along the primary dimension and then along the secondary.

Adaptive routing: the collection of paths advancing node-to-node in the same primary and secondary directions as the dimension-order routing. At each intermediate node it must be possible to advance in either direction until the dimension coordinate in a direction matches that of the destination.

Initial hop: a routing option which allows a hop from the source node in any direction to an adjacent node. This option allows some connection of nodes in imperfect meshes.

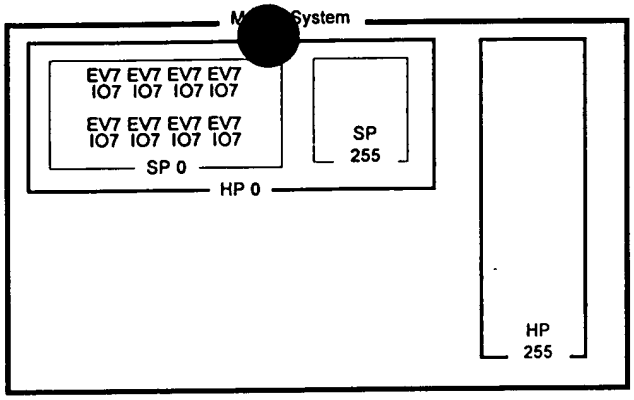
SRC routing: another deadlock-free routing method in which travel proceeds first along the secondary dimension.

Fig. 36 Routing Glossary

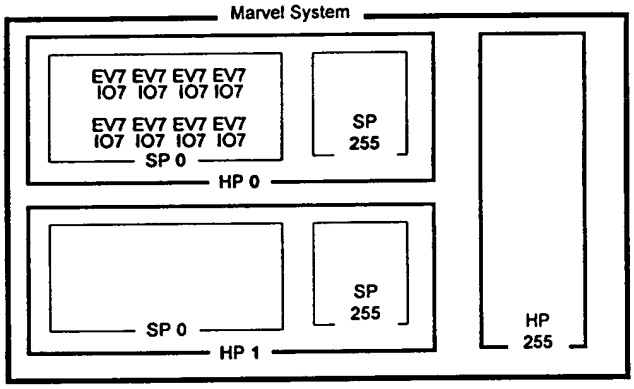


Partition Coordination

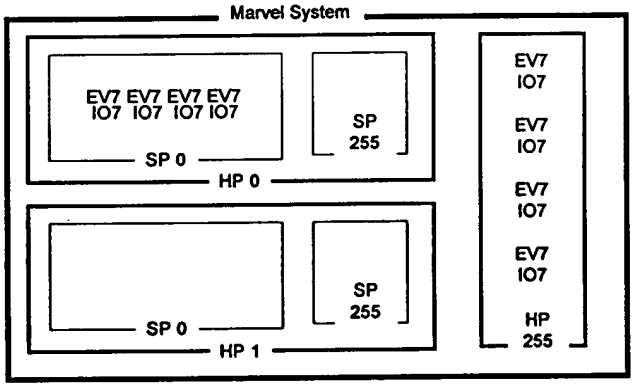
Fig. 37



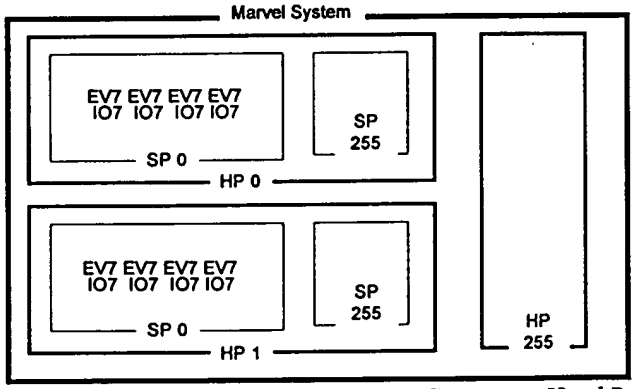
At initial poweron, the unconfigured Marvel system is configured to have all resources in a single subpartition. The global free pool (HP 255) is empty.



The user creates hard partition 1 (HP1) with subpartition 0 (SP 0). The partition free pool (SP 255) is created automatically.



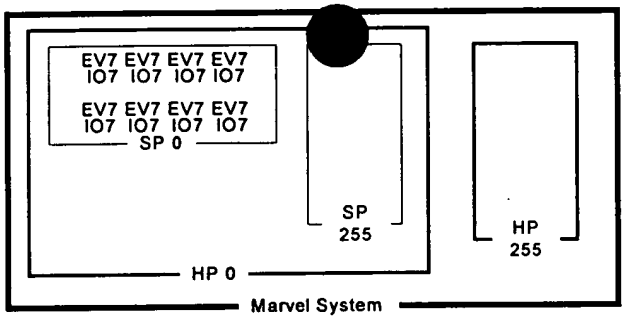
The user deletes several EV7s from the hard partition (HP 0) and they migrate to the global free pool (HP 255).



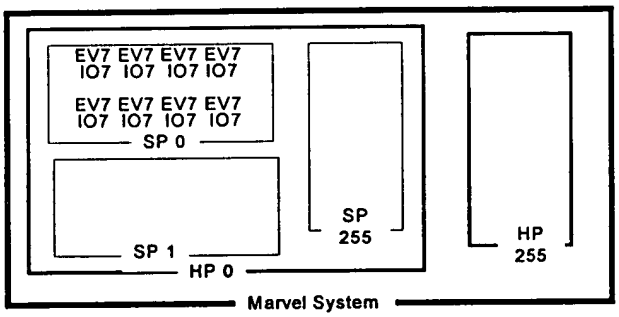
The user can move the EV7s into the new partition, (HP 1,SP 0). By default the IO7s are assigned to the same partition as the EV7 to which it belongs.

Creating a Hard Partition Block Flow

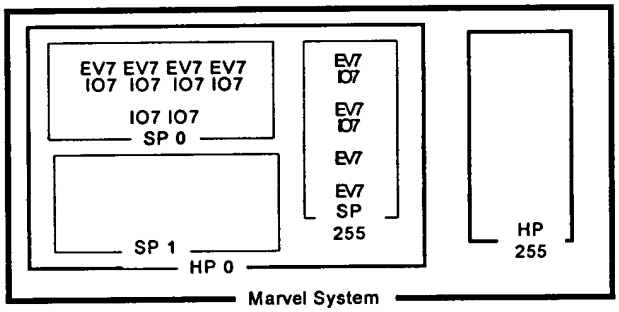
Fig. 38



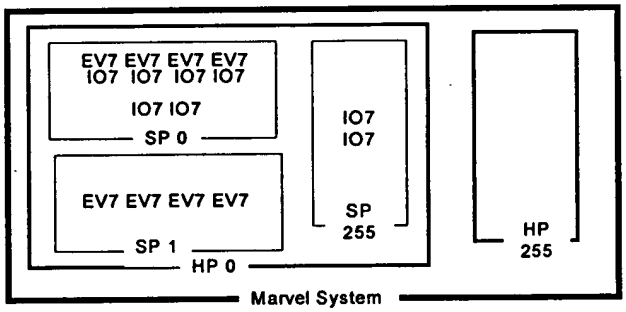
The initial system defaults all the resources into one partition.



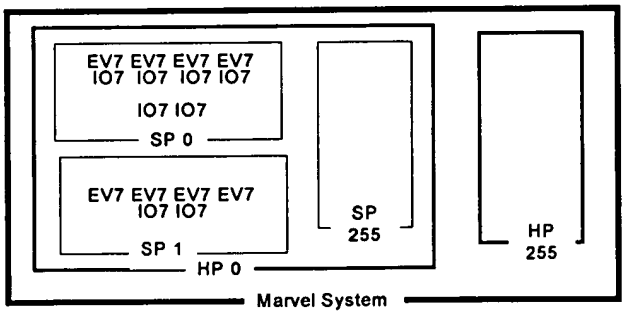
The user created a 2nd subpartition (SP 1) within the existing hard partition (HP 0).



The user deletes EV7s from SP 0, migrating them into the partition free pool (SP 255). Unlike moving them out of the hard partition, the IO7s do not stick to their EV7s. The user issues separate delete IO7 commands, and in this example, only migrat s 2 IO7s.



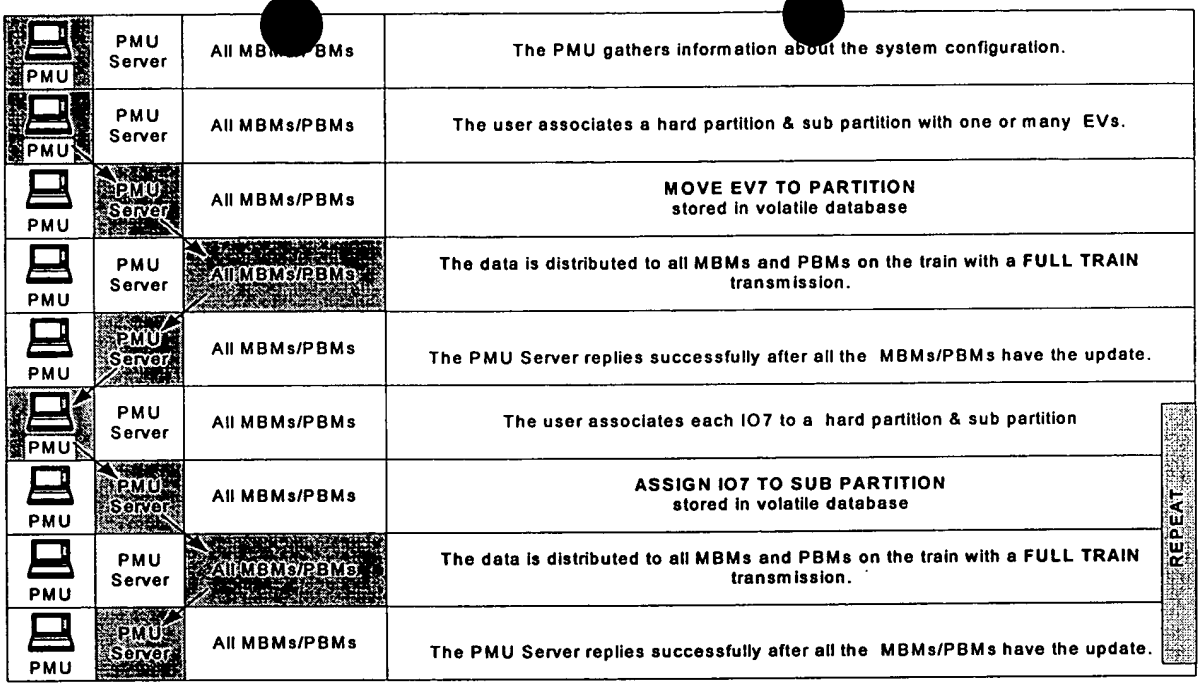
In configuring the new subpartition (SP 1), EV7s are Moved into the partition. Again note the IO7s are acted upon independent of the EV7.



To get the IO7s into the new subpartition, an Assign command is used.

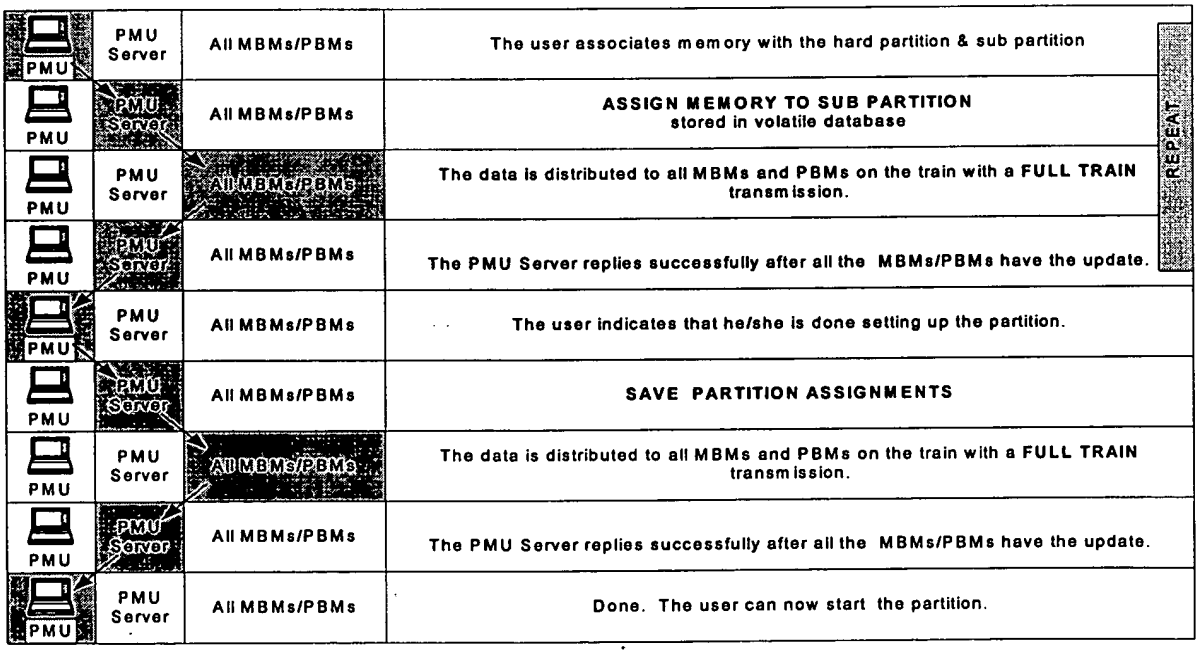
Creating a SubPartition Block Flow

Fig. 39



Creating a New Partition Flow Diagram (Part 1 of 2)

Fig. 40



Creating a New Partition Flow Diagram (Part 2 of 2)

Fig. 41

RESET STATE

PMU	PMU Server	Group Leader	MBMs	CMMs	EV7s	After a group formation, the leader reconciles the partition database and starts up a partition coordinator for each partition. The PC is started on the lowest MBM id in the partition.
PMU	PMU Server	Part. Coord	MBM	CMMs	EV7s	The PC gathers information about the current state of the partition. Each MBM in the partition is queried for state of the CMMs with the **GET MBM CONFIGURATION** request
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	Each CMM in the partition is queried with the **GET CMM STATE** command.
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	Each CMM returns the status of the EV7s it controls.
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The MBM assembes the data from all the CMMs into the reply to the **GET MBM CONFIGURATION**
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	Each PBM in the partition is queried for state of the CMMs with the **GET PBM CONFIGURATION** request
PMU	PMU Server	Part. Coord	PBMs	CMMs	EV7s	The PBMs reply with the IO7 configuration.
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The P.C. sets the state of the partition to *RESET-IN-PROGRESS* with the **SET PARTITION STATE.**
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The command goes to all MBMs in the entire system, not just the ones in this partition. The MBMs record the state. See the "MBM Start Partition State Diagram."
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The Part. Coord. determines the PID of every EV7 in the hard partition and assigns a PID. The CMM is sent a **CONFIG RBOX/CBOX** packet with this PID value and defaults for router tables.
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The CMM stores the PID information in ram that is accessible by the EV7 for later retrieval.
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The Partition Coordinator performs a partition reset by issuing, individually, a **PULSED RESET** to each EV7 in the partition.
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The CMM intercepts this command and performs the **PULSED RESET** on the EV7s. The CMM facilitates the FPGA load and SROM load which then loads the XSROM the the **LOAD XSROM IMAGE** packet.

Partition Start Flow Diagram (Reset State)

Fig. 42

DIAGNOSTIC STATE

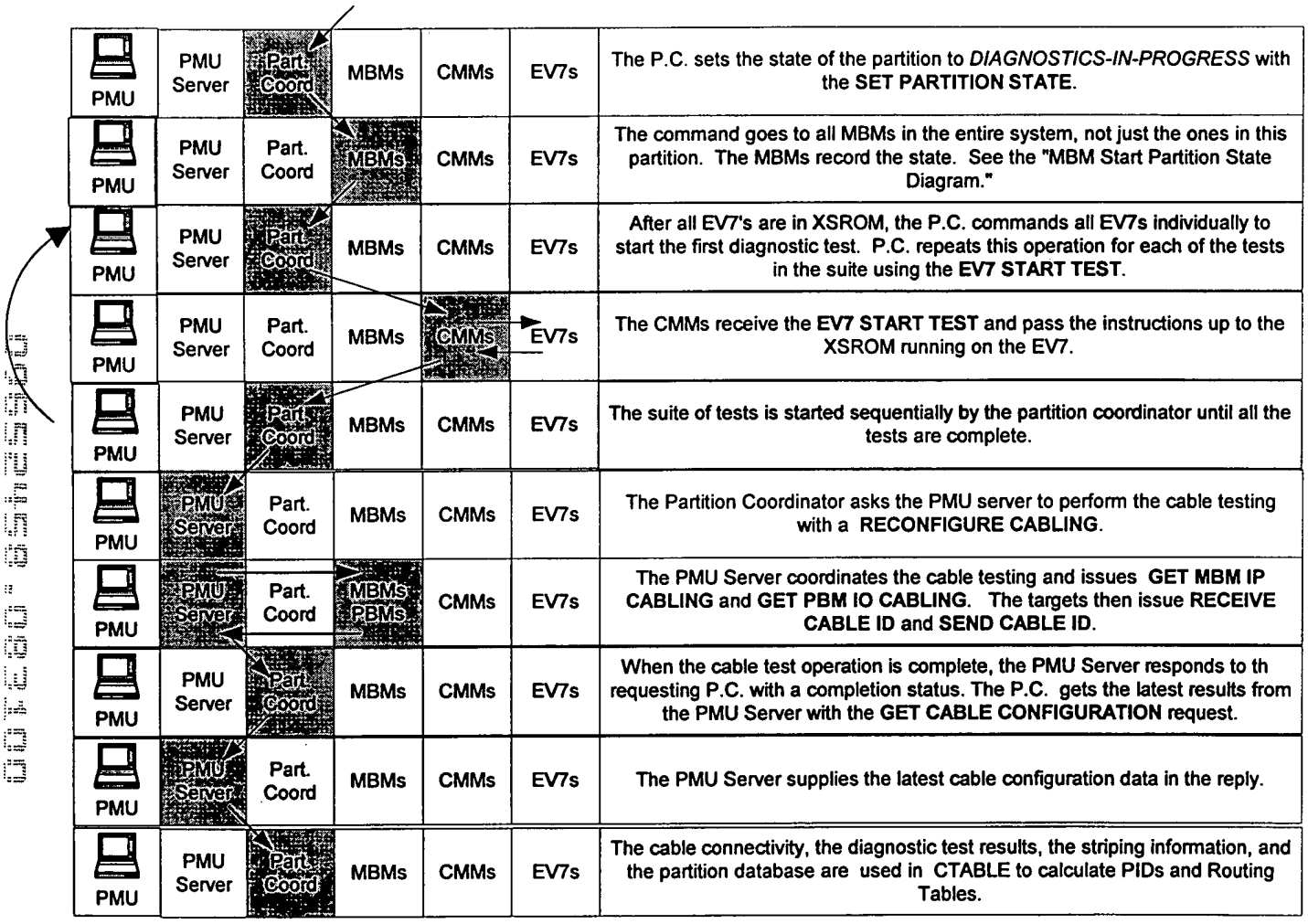
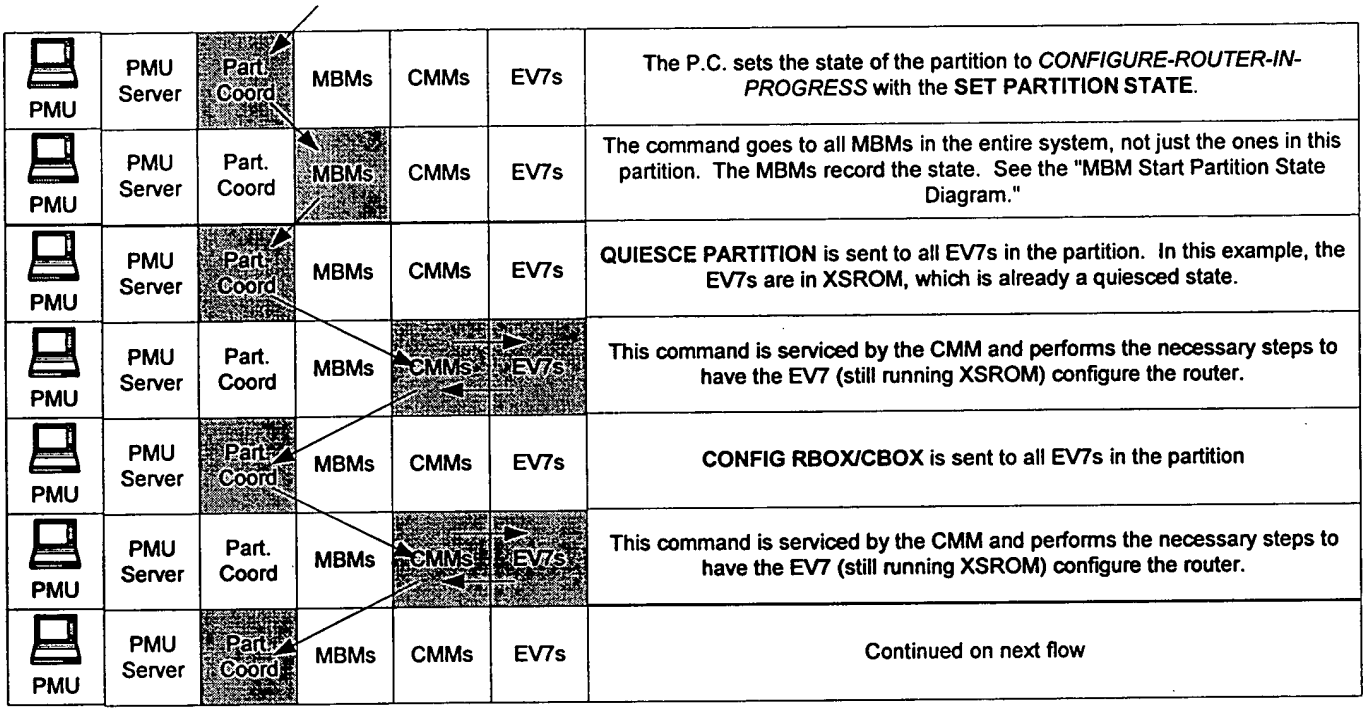


Figure 43 Partition Start Flow Diagram, Diagnostic State

CONFIGURE ROUTER



Partition Start Flow Diagram (Configure Router)

Fig. 44

CONTINUE PARTITION and PARTITION RUNNING

PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The P.C. sets the state of the partition to *CONTINUE-PARTITION-IN-PROGRESS* with the **SET PARTITION STATE** .
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The command goes to all MBMs in the entire system, not just the ones in this partition. The MBMs record the state. See the "MBM Start Partition State Diagram."
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The non-primary EV7s are given an **EV7 START TEST** that sets them waiting for a flag to jump into the running image.
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	This command is forwarded by the CMM and EV7s are now ready and waiting
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The partition is now completely configured. All EV7s are running XSROM. The P.C. now directs the primary EV7 to start the SRM console via the **LOAD IMAGE**
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s (P)	The CMM intercepts this command and performs the necessary operations to get the **P**rimary EV7 loaded and running.
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The Primary EV7, writes a flag in each of the other EV7s , indicating that they should jump into the running image.
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The P.C. sets the state of the partition to *PARTITION RUNNING* with the **SET PARTITION STATE.**
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The command goes to all MBMs in the entire system, not just the ones in this partition. The MBMs record the state. See the "MBM Start Partition State Diagram."
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The P.C. notifies the PMU server in the system that the partition has been started.
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The PMU Server notifies all the connected PMUs that the partition has been started.
PMU	PMU Server	Part. Coord	MBMs	CMMs	EV7s	The End

Partition Start Flow Diagram (Running)

Fig. 45

OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s	OS uses SRM callback [illegible]sue **ADD EV7 TO RUNNING PARTITION** listing EV7#4 and EV7#5 and Hard Partition #2 Sub #1. Th PMU Serv r handles th request.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s	The PMU Server knows th address of the partition coordinator and forwards the **ADD EV7 TO RUNNING PARTITION** to the appropriate part. coord.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s	The PMU Server issues a **SET PARTITION STATE** to *PARTITION CHANGE IN-PROGRESS* to all MBMs via the train mechanism.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s in HP#2	All MBMs/PBMs track this state in their replicated data base. PMU Server access is limited until the partition change completes.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s in HP#2	The Part. Coord. directs the PMU Server to **RECONFIGURE CABLING** to get the current status of the cables
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s in HP#2	The PMU Server coordinates the cable testing. Details are in a later section of this document. Results are stored att the PMU Server. **GET MBM IP CABLING, GET PBM IO CABLING, SEND CABLE ID, RECEIVE CABLE ID**
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s in HP#2	Upon successful complestion of the cable test, the Part. Coord. issues a **GET CABLING CONFIGURATION** to the PMU Server to get the latest cable data.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s in HP#2	The PMU Server responds with the current cable connectivity data base.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s in HP#2	The Part. Coord validates the cable connectivity. If okay **ADD EV7 TO RUNNING PARTITION** is distributed to all MBMs/PBMs on the LAN via the train mechanism.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s in HP#2	All MBMs/PBMs modify their replicated data bases to track this change to the free pool and to partition #2.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7#4 EV7#5	**PULSE EV7 RESET** is directed at EV7#4 and EV7#5 (command iss nt to the CMM)
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7#4 EV7#5	EV7#4 and EV7#5 are reset. The CMM faciliates the SROM load. Th XSROM is started with the **LOAD IMAGE**.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s in HP#2	continues on next figure

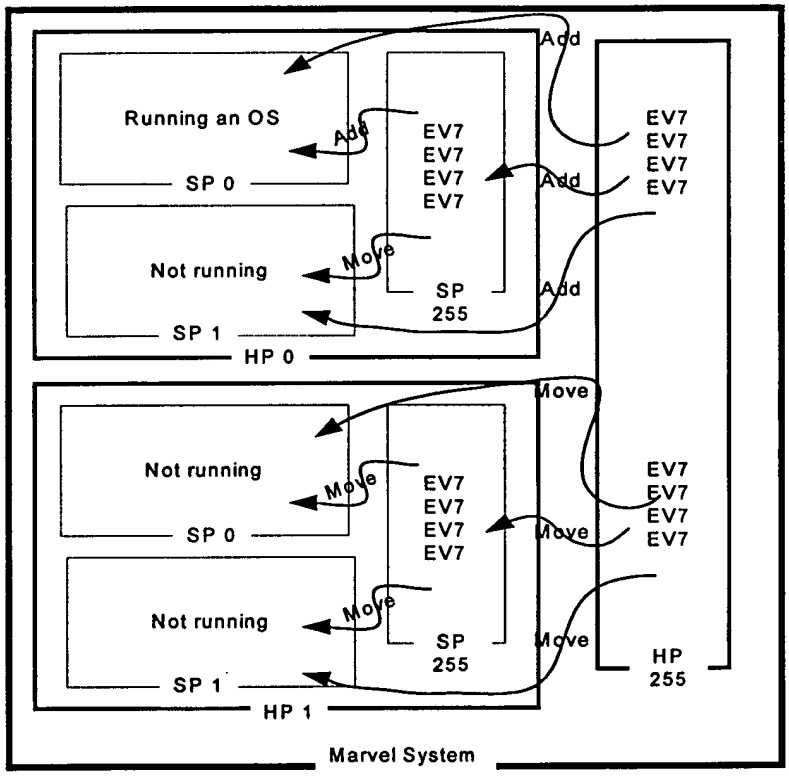
Add EV7 Flow Diagram (Part 1)

Fig. 46 A

OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s in HP#2	The Part. Coord. calculates th routability of the proposed new configuration. If there is a routing error th command finish s with error. When routing is successful, a **SET PARTITION STATE** to *CONFIG-ROUTE-IN-PROGRESS*
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s in HP#2	All MBMs receiv the **SET PARTITION STATE** via the train mechanism and set their databases to indicate that HP#2 is in the *CONFIG-ROUTE-IN-PROGRESS* state
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s in HP#2	When the train completes, the Part. Coord. commands each EV7 in hard partition #2,individually, to **QUIESCE.**
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s in HP#2	**QUIESCE** is recieved at the CMMs in the partition and and they take actions to quiesce the EV7. EV#4 and EV#5 are in XSROM and do not have to be quiesced.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s in HP#2	**CONFIG RBOX/CBOX** is sent to all EV7s in the partition, which includes EV#4 and EV#5 which are in XSROM.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CMMs in HP#2	EV7s in HP#2	**CONFIG RBOX/CBOX** is received at the CMMs and they direct the EV7 to config the RBOX and the CBOX.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CCMs in HP#2M	EV7s in HP#2	**SET PARTITION STATE** to *CONTINUE-PARTITION-IN-PROGRESS.* This is distributed via the train mechanism.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CCMs in HP#2M	EV7s in HP#2	All MBMs/PBMs track the state of the partition in their replicated data base.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CCMs in HP#2M	EV7s in HP#2	**CONTINUE PARTITION** is sent to all EV7s in the partition, including EV7#4 and EV7#5.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CCMs in HP#2M	EV7s in HP#2	All MBMs/PBMs track the state of the partition in their replicated data bas .
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CCMs in HP#2M	EV7s in HP#2	**SET PARTITION STATE** to *PARTITION RUNNING* is issued on the train.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CCMs in HP#2M	EV7s in HP#2	All MBMs/PBMs track the state of the partition in their replicated data base.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CCMs in HP#2M	EV7s in HP#2	The Part. Coord. notifies the PMU Server that the **ADD EV7 TO PARTITION** is done.
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CCMs in HP#2M	EV7s in HP#2	The PMU Server responds to the original **ADD EV7 to PARTITION.**
OS via SRM	PMU Server	Part. Coord HP#2	MBMs PBMs	CCMs in HP#2M	EV7s in HP#2	The End.

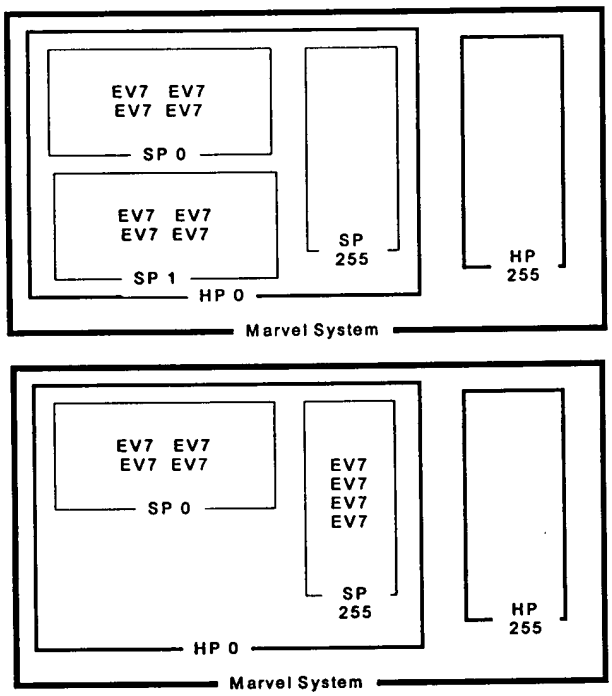
Add EV7 Flow Diagram (Part 2)

Fig. 46B



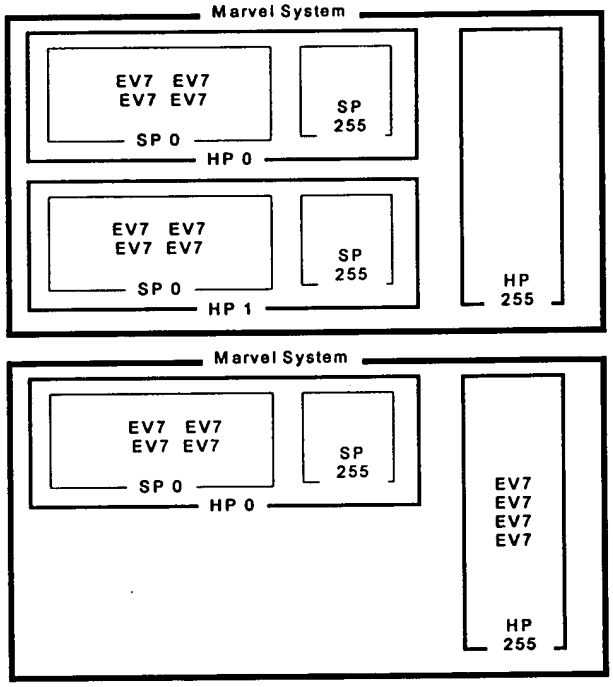
Add vs Move

Fig. 47



Destroying a soft partition

Fig. 48

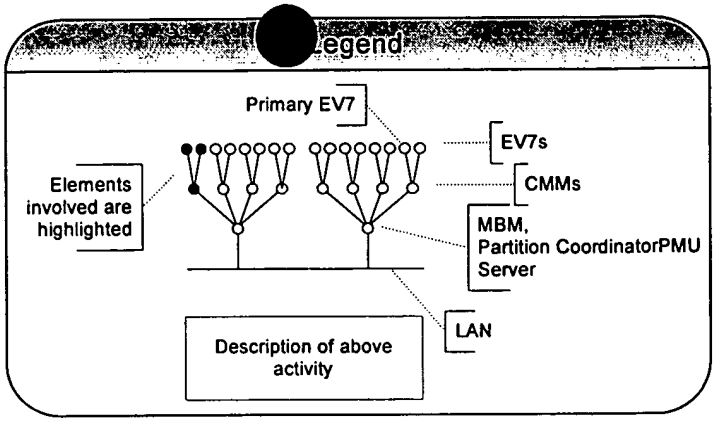


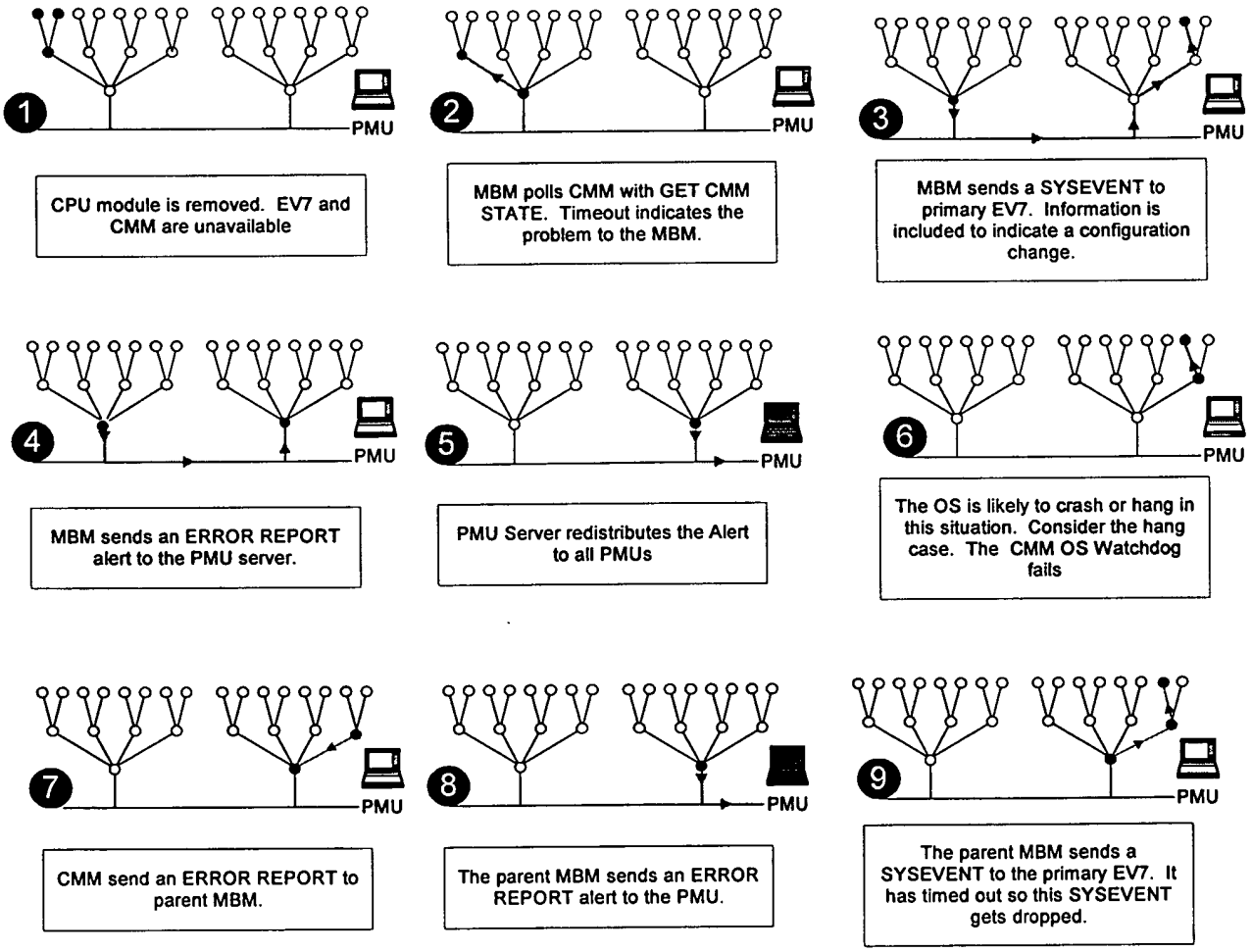
Destroying a hard partition

Fig. 49

This flow is an exa[redacted] of SM protocol activity when a CPU module fails. The entire configuration is one partition, and the failing CPU module is not the primary.

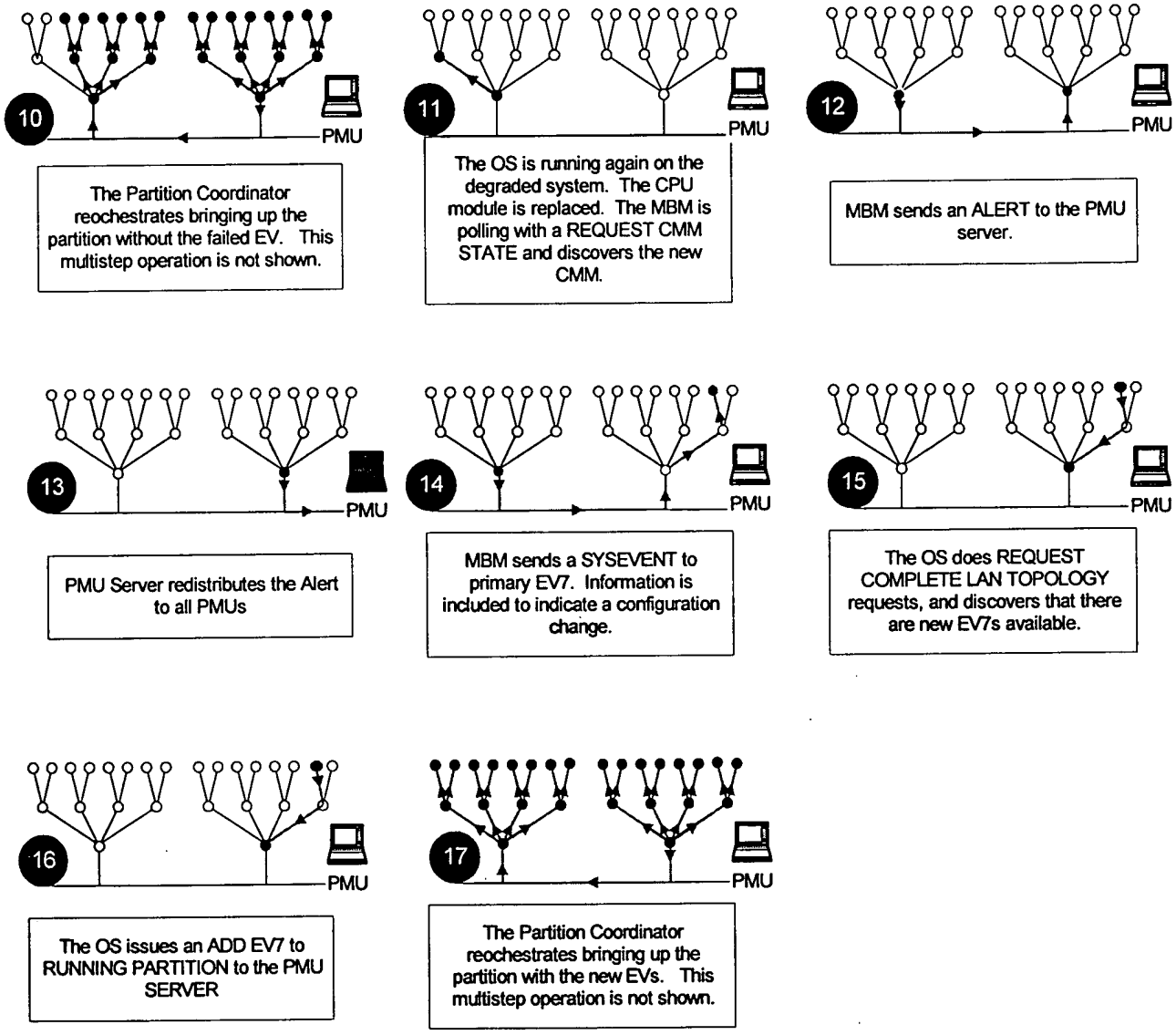
The operating system does crash, and is restarted. The failed CPU module is replaced and the original complete configuration is restored.





EV7 Failure/Replace Flow Diagram (Part 1)

Fig. 50



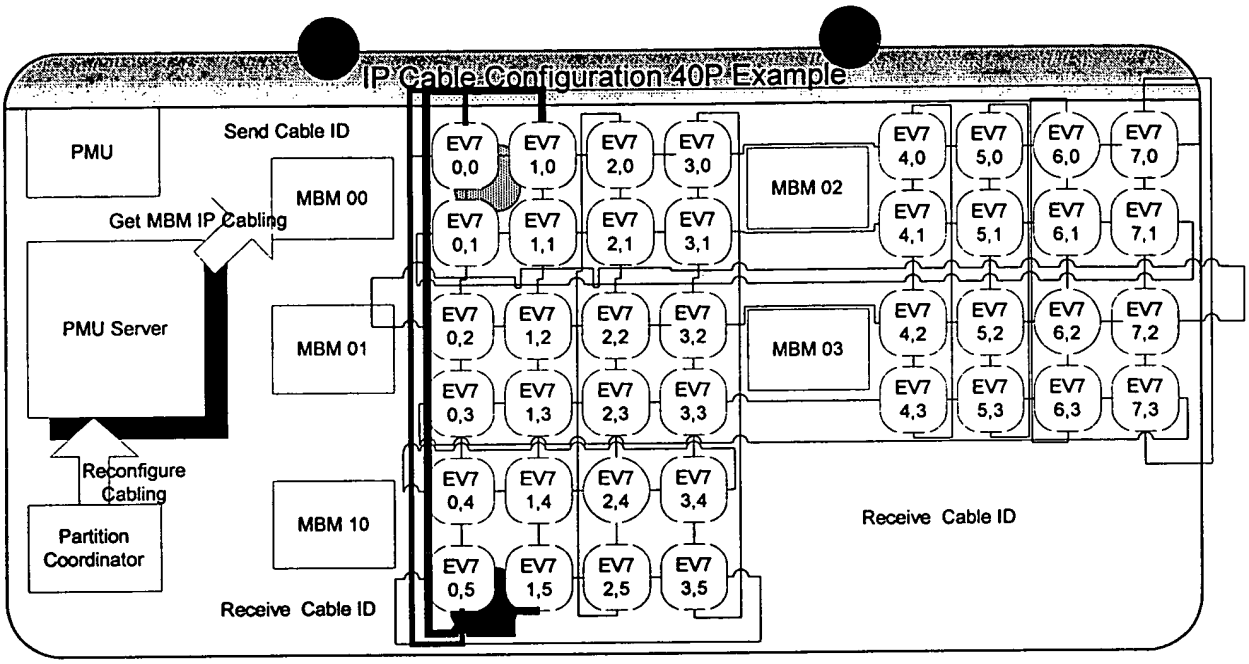
EV7 Failure/Replacement Flow Diagram (Part 2)

Fig. 51

PMU	MBM1	MBM2	PBM0	New MBM3	The Marvel system is running with MBM1, MBM2, and MBM3. A new 8P is rolled up and plugged into the SM LAN and powered up.
PMU	MBM1	MBM2	PBM0	New MBM3	MBM3 recognizes that it is joining a already formed group of processors and has a different membership list than the group it has joined. MBM3 goes its a passive listening state.
PMU	MBM1	MBM2	PBM0	New MBM3	The New MBM3 is not defined as a member in the old group, so it is isolated from the group.
PMU	MBM1	MBM2	PBM0	New MBM3	The operator issues a **SET MEMBERSHIP CONFIGURATION** to the PMU to change the membership list from {MBM1,MBM2,PBM0} to {MBM1,MBM2,MBM3,PBM0}. The PMU broadcasts this to the entire LAN.
PMU	MBM1	MBM2	PBM0	New MBM3	All LAN members receive this membership list and change their expected membership data. Then they all participate in new group formations.
PMU	MBM1	MBM2	PBM0	New MBM3	The group is formed MBM3 is now an active member.

Set Membership Configuraton Flow Diagram

Fig. 52



IP Cable Configuration Block Diagram

Fig. 53

The EV7 Ids (x,y) [illegible]termined by the thumb-wheel setting using the [illegible]ing algorithm:

x (E,W coordinate) = ((Rack Number>>2)*8) + ((MBM number>>1)*4) + CMM number

y (N,S coordinate) = ((Rack Number & 0x03)*4) + ((MBM number & 0x01)*2) + EV7 number

where:

Rack Number is the high order half byte of the MBM thumb-wheel

MBM Number is the low order half byte of the MBM thumb-wheel

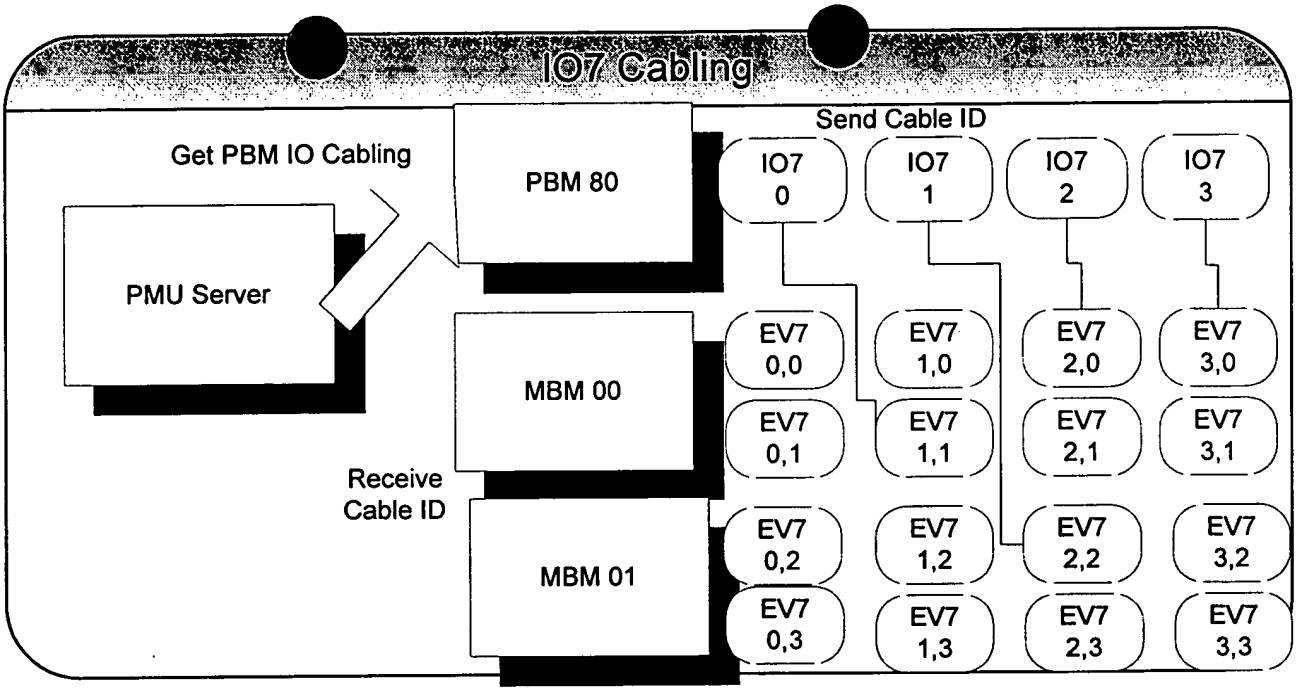
CMM Number is from 0 to 3 within an MBM

EV7 number is 0 or 1 within a CMM

In a similar manner when the x,y axis coordinated of an EV7 are known, the thumb-wheel number can be derived and inserted into the IP address for the MBM, CMM and EV7s.

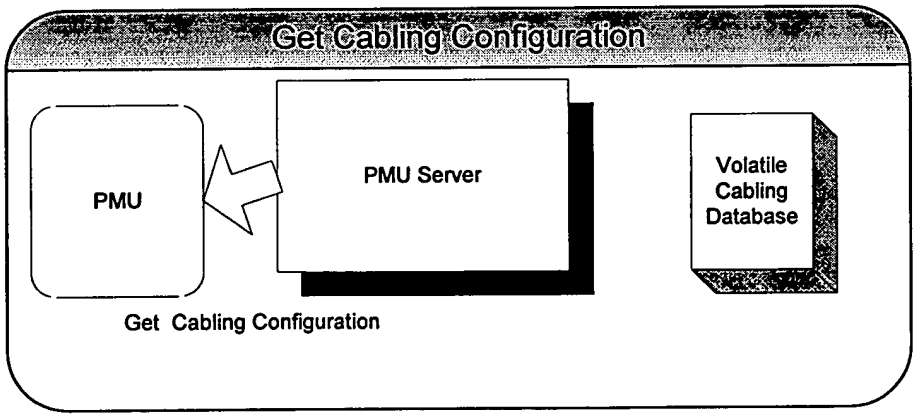
EV7 Coordinate addressing relationship to thumbwheel addressing

Fig. 54



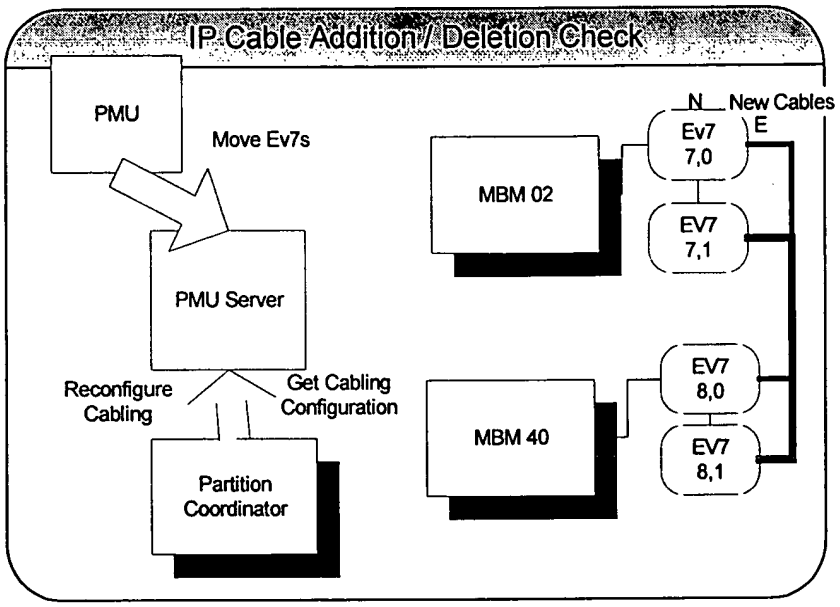
IO7 Cabling Block Diagram

Fig. 55



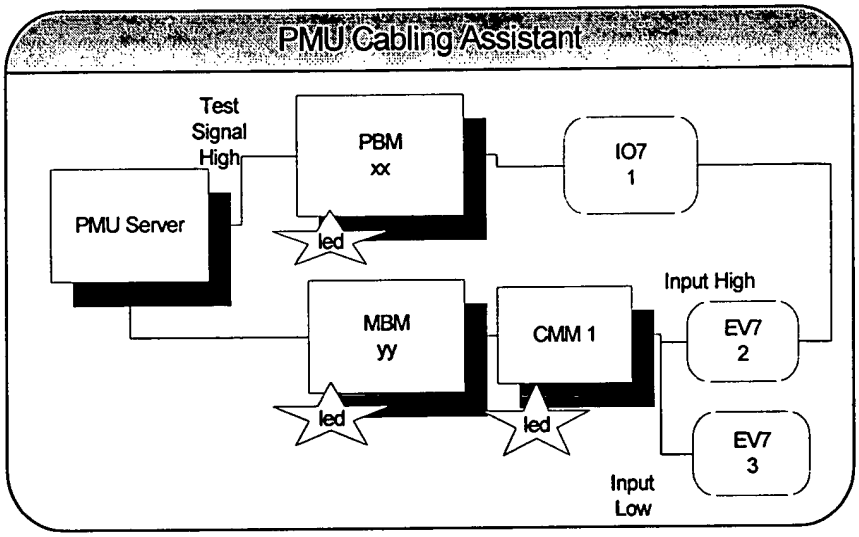
Get Cable Configuration Block Diagram

Fig. 56



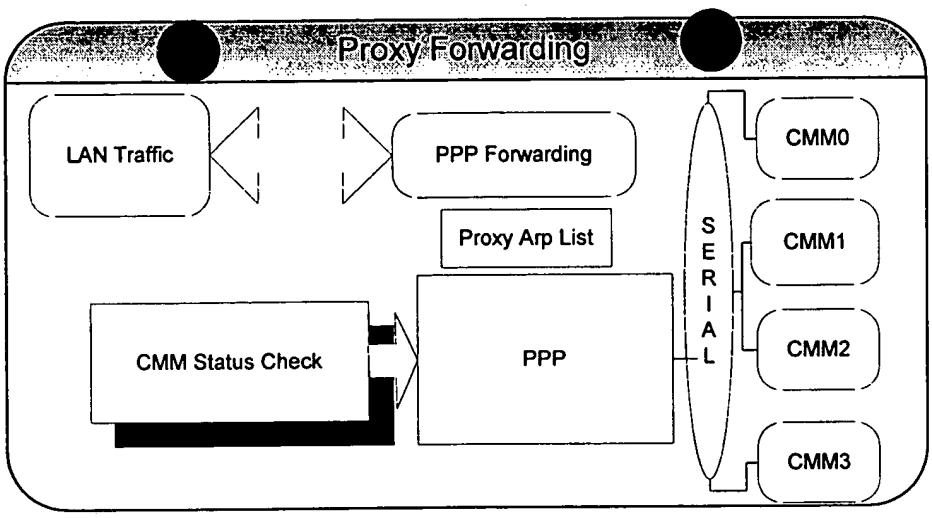
IP Cable Addition/Deletion Block Diagram

Fig. 57



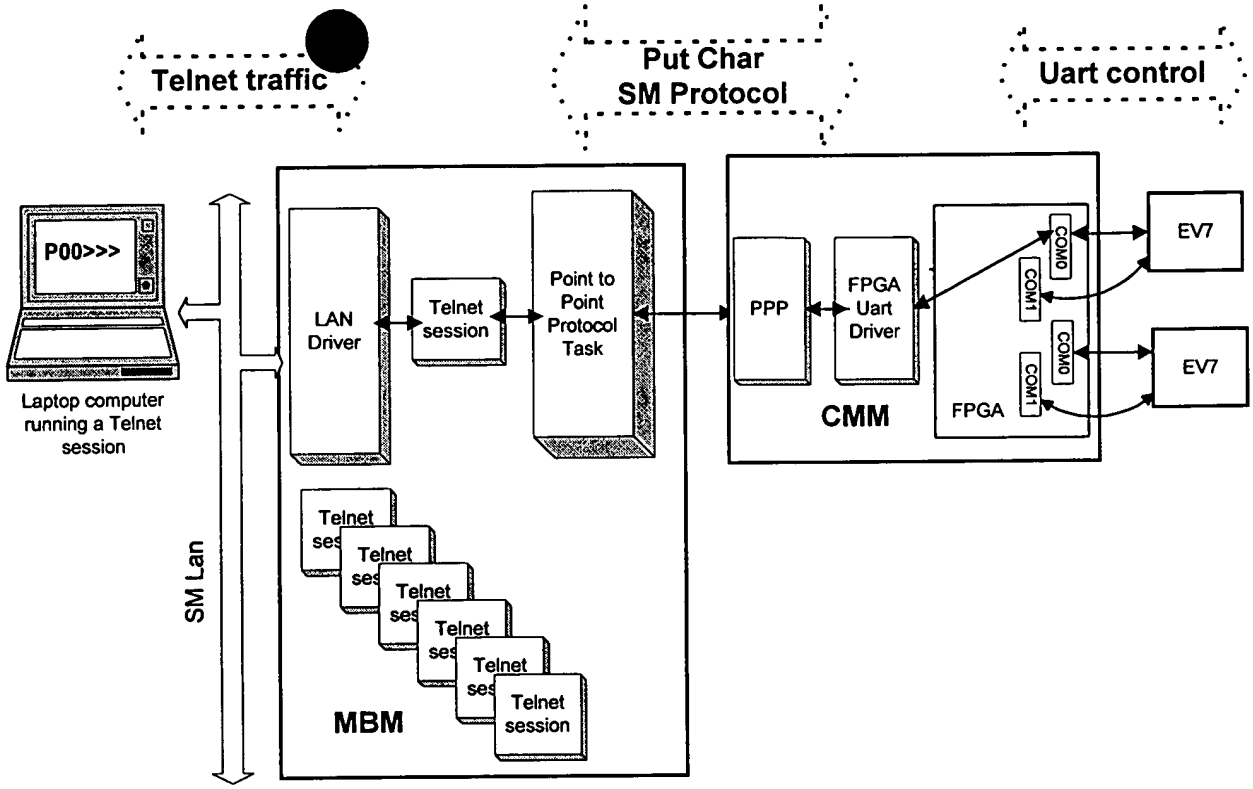
PMU Cabling Assistant Block Diagram

Fig. 58



Proxy Forwarding Block Diagram

Fig. 59



Virtual Console Terminal Overview

Fig. 60

CMM	EV7	COM1 Port	COM2 Port
1	1	323	324
1	2	325	326
2	1	327	328
2	2	329	330
3	1	331	332
3	2	333	334
4	1	335	336
4	2	337	338

Virtual Terminal Telnet

Fig. 61

Virtual Terminal Session

PMU	PMU Server	Telnet Svr for Pri EV7	MBMs	CMMs	EV7s	
PMU	PMU Server	Telnet Svr for Pri EV7	MBMs	CMMs	EV7s	The PMU platform is plugged into an available port on the SM LAN
PMU →	PMU Server	Telnet Svr for Pri EV7	MBMs	CMMs	EV7s	The PMU sends a **Get Telnet IP Address/Port** request to PMU Server for the address of the telnet server for the primary EV7 for a partition
PMU ←	PMU Server	Telnet Svr for Pri EV7	MBMs	CMMs	EV7s	PMU Server gives to the PMU the address of the telnet server for the primary EV7 (**Get Telnet IP Address/Port** response packet)
PMU →	PMU Server	Telnet Svr for Pri EV7	MBMs	CMMs	EV7s	User starts a telnet session on the PMU using the telnet server address from previous step
PMU	PMU Server	Telnet Svr for Pri EV7 →	MBMs	CMMs	EV7s	Telnet server passes characters to Virtual Console task on MBM for Primary EV7
PMU	PMU Server	Telnet Svr for Pri EV7	MBMs →	CMMs	EV7s	MBM for Primary EV7 passes characters to CMM for Primary EV7 using **PUT_CHAR** packet
PMU	PMU Server	Telnet Svr for Pri EV7	MBMs	CMMs →	EV7s	CMM strips off IP addressing info and passes the character to Primary EV7 through the virtual console uart registers
PMU	PMU Server	Telnet Svr for Pri EV7	MBMs	CMMs ←	EV7s	Primary EV7 responds with characters back to CMM
PMU	PMU Server	Telnet Svr for Pri EV7	MBMs ←	CMMs	EV7s	CMM envelops character in **PUT_CHAR** protocol packet and gives to MBM
PMU	PMU Server	Telnet Svr for Pri EV7 ←	MBMs	CMMs	EV7s	MBM Virtual Console task passes character to Telnet server
PMU ←	PMU Server →	Telnet Svr for Pri EV7	MBMs	CMMs	EV7s	Telnet server passes character to Telnet session on PMU

Virtual Terminal Flow Diagram

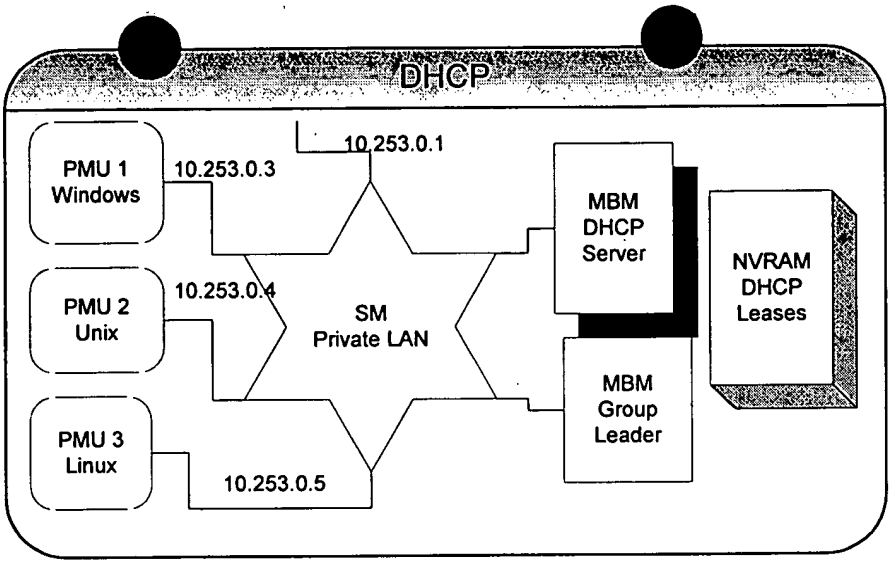
Fig. 62

SET BASE TIME

PMU	PMU Server	MBMs	PBMs	The PMU is plugged into an available port on the SM LAN, gets an IP address
PMU →	PMU Server	MBMs	PBMs	The PMU sends a **Get Base Time** request to PMU Server
PMU ←	PMU Server	MBMs	PBMs	PMU Server gives to the PMU the current base time in ? format
PMU	PMU Server	MBMs	PBMs	User types in new time at PMU
PMU →	PMU Server	MBMs	PBMs	PMU give new time to PMU server in**Set Base Time** packet
PMU →	PMU Server	Group Leader MBM	PBMs	PMU Server gives new base time to group leader's time server
PMU	PMU Server	MBMs	PBMs	New base time is propagated among MBMs and PBM through the base time synchronizer task

Set Base Time Flow Diagram

Fig. 63



DHCP Block Diagram

Fig. 64

Content	*TFTP Filename*	*Block Size*	*Sector Start(offset)*	*Sector End*
MBM/PBM Firmware	"mbmfw", "pbmfw"	2 MB	0	7
CMM, CMM_FSL, FPGA, SROM, XSROM Firmware	"cmmfw", "cmmfsl", "cmmfpga", "sromfw", "xsromfw"	0.5 MB	8(0,tbd,tbd,tbd,tbd,tbd)	9
Error Logs		1 MB	10	13
MBM/PBM FSL Firmware	"mbmfsl", "pbmfsl"	0.5 MB	14	15
NVRAM – partition database		0.75 MB	16	18
SRM Firmware	"srmfw"	2 MB	20	27
FPGA loaded by PBM on PCI Drawers	"pbmfpga"	0.25MB	28	28
MBM/PBM Boot[if required by HW]		0.25	19(0,0x30000)	19

Flash Layout

Fig. 65

Byte Offset	Value
0.. 7	0x010100005500aaff
8.. 19	Image Revision in ASCII
20.. 23	Vendor String in ASCII (CPQ)
24.. 31	Module ID in ASCII (SRMFW,MBMFW,MBMFSL,CMMFW,CMMFSL,SROMFW,XSROMFW,CMMFPGA)
32.. 35	Firmware Type in ASCII (ALPH, X86)
36.. 43	0x00
44.. 47	Code Length in bytes
48.. 59	ROM Object Name (FW,FSL,SROM,XSROM,FPGA)
60.. 63	0x11223344

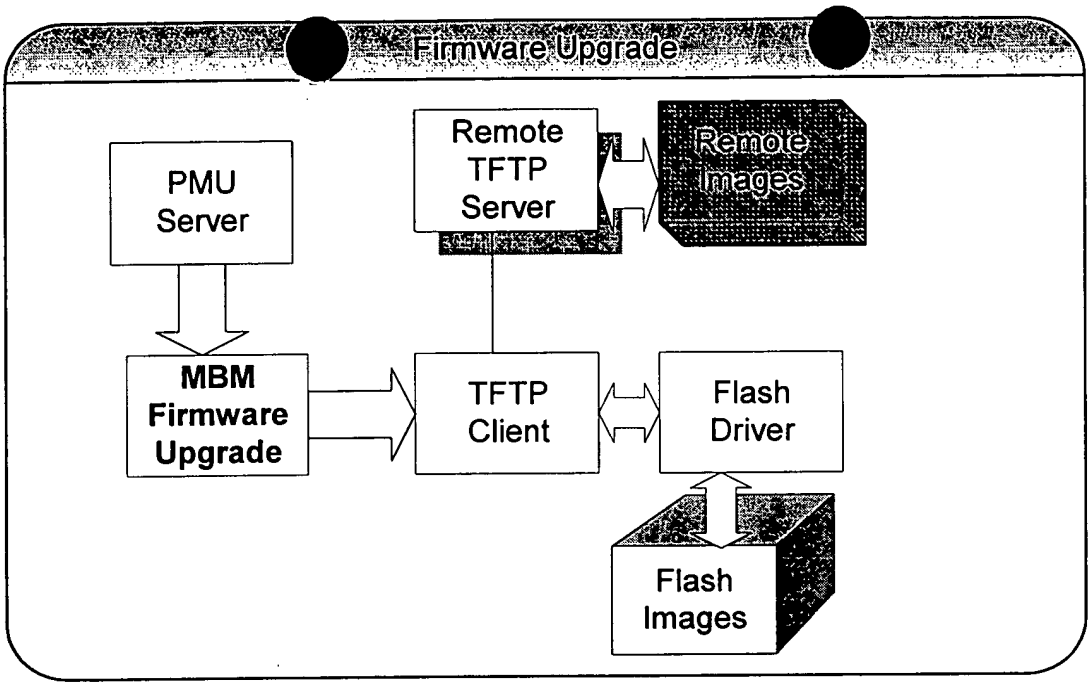
Image Header

Fig. 66

All MBMs PBMs	MBM	CMM	SRM	The primary CPU in the partition issues the command >>> set bootdef_dev dka100 This becomes a **STORE ENVIRONMENT VARIABLES** packet
All MBMs PBMs	MBM	CMM	SRM	MBM waits for the train to arriv and th n retransmits the **FULL TRAIN MESSAGE** with the **STORE ENVIRONMENT VARIABLES** payoad.
All MBMs PBMs	MBM	CMM	SRM	All MBMs receive the train, copy out the payload and hold that payload as a pending command. The MBM passes along the **FULL TRAIN MESSAGE**, and wait for the empty train.
All MBMs PBMs	MBM	CMM	SRM	The train makes it full circle back to the originating MBM. It then commits the SRM environment variables to their flash. It then puts the **FULL TRAIN MESSAGE** into the train payload and reissues it.
All MBMs PBMs	MBM	CMM	SRM	All MBMs commit the data to their flashes and pass on the **FULL TRAIN MESSAGE.**
All MBMs PBMs	MBM	CMM	SRM	The train makes it full circle back to the originating MBM. It now can respond to the **STORE ENVIRONMENT VARIABLES** command and sends out the **EMPTY TRAIN MESSAGE.**
All MBMs PBMs	MBM	CMM	SRM	The reply passes through the CMM and back to the EV7 running the SRM console with a successful completion status.

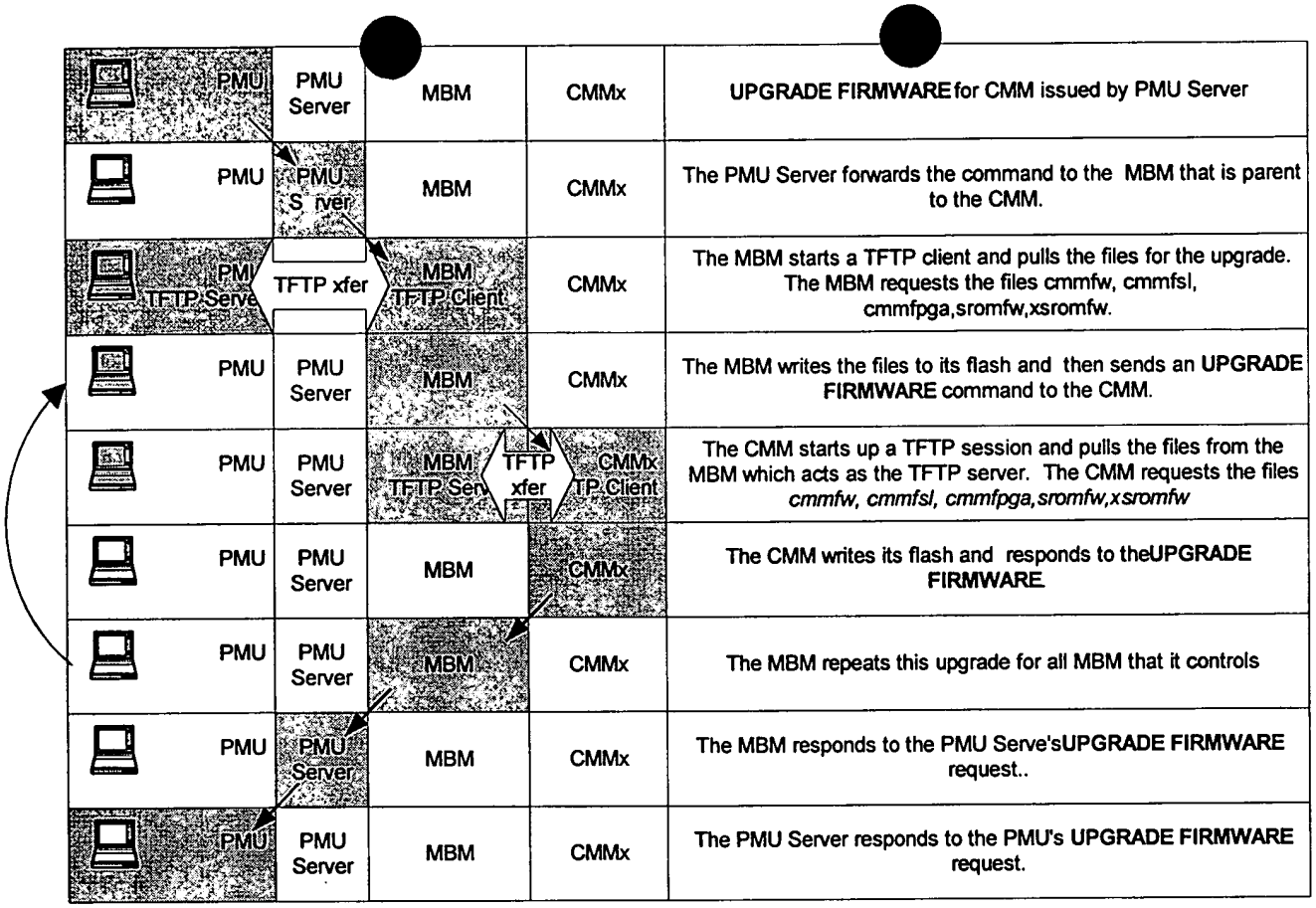
SRM Environment Vars Flow Diagram

Fig. 67



Firmware Load and Upgrade Block Diagram

Fig. 68



Upgrading CMM Firmware Flow Diagram

Fig. 69

ERROR LOG ENTRY										
Size (dec)	Start (hex)	End (hex)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2	0	1	Entry Number (1-0xfffe before wrapping)							
6	2	7	Time Stamp (ssmmhhDDMMYY)							
2	8	9	Entry Size							
n	A	n+A	Entry Data							

Error Log Entry Format

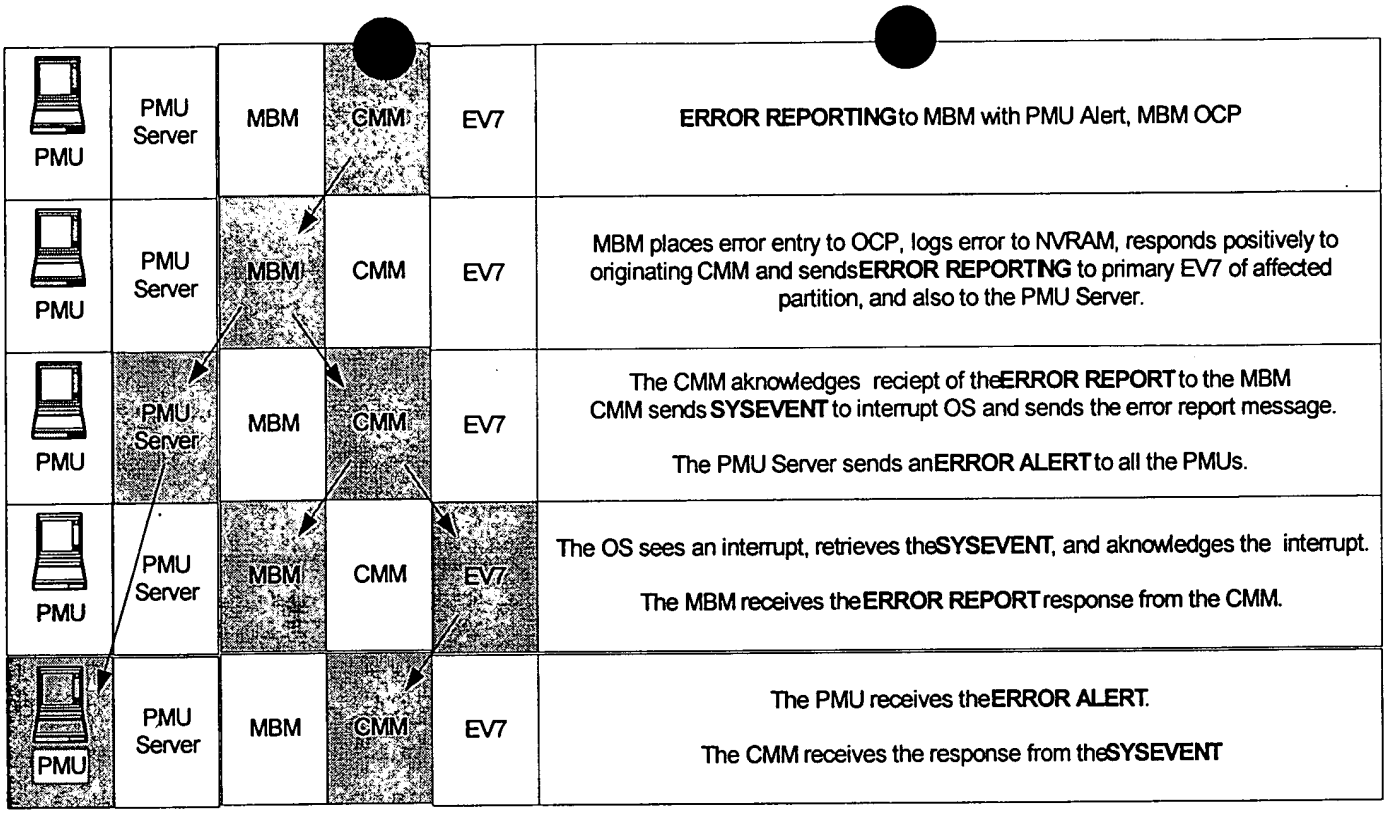
Fig. 70

ERROR ENTRY DATA										
Size (dec)	Start (hex)	End (hex)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4	0	3	Entry Number							
1	4	4	Severity Level							
1	5	5	Entity in Error							
1	6	6	Instance							
2	7	8	Error Code							
16	9	18	Serial Number							
n	19	n+19	Variable Data							

Entry Number	IP address of CMM, MBM, PBM, or EV7 that encountered the error.
Severity Level	Informational=0; Warning=1; Error=2;
Entity in Error	The device code for the device in error (e.g. CMM,RIMM, EV7, Thermal, Volatage)
Instance	The instance of the entity
Error Code	Error enumeration or index into a set of text messages
Serial Number	Identifying address where the error occurred.
Variable Data	Additional data specific to this error code.

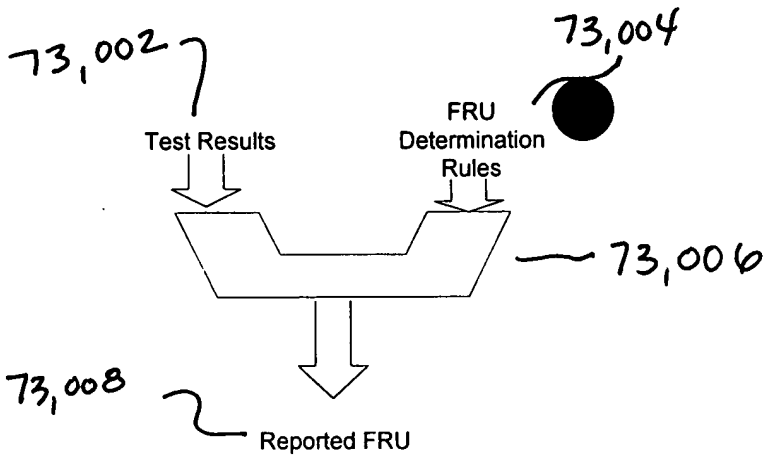
Error Entry Data Format

Fig. 71



Error Reporting Flow Diagram

Fig. 72



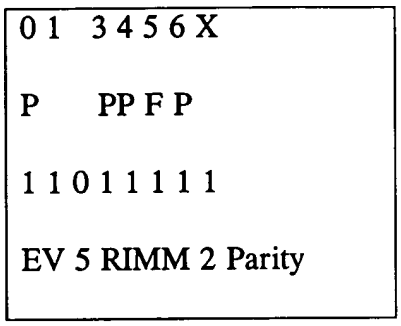
Field Replaceable Unit

Fig. 73

Line	12345678901234567890
1	<Overall Progress>
2	<Current State>
3	<Location within State>
4	<Error Message>

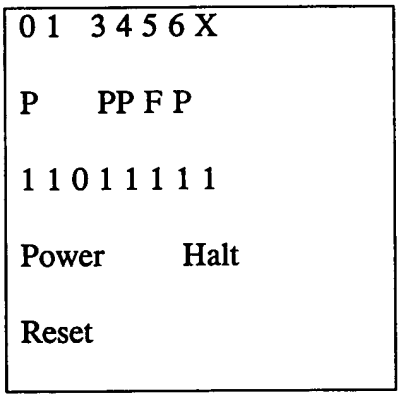
OCP Template

Fig. 74



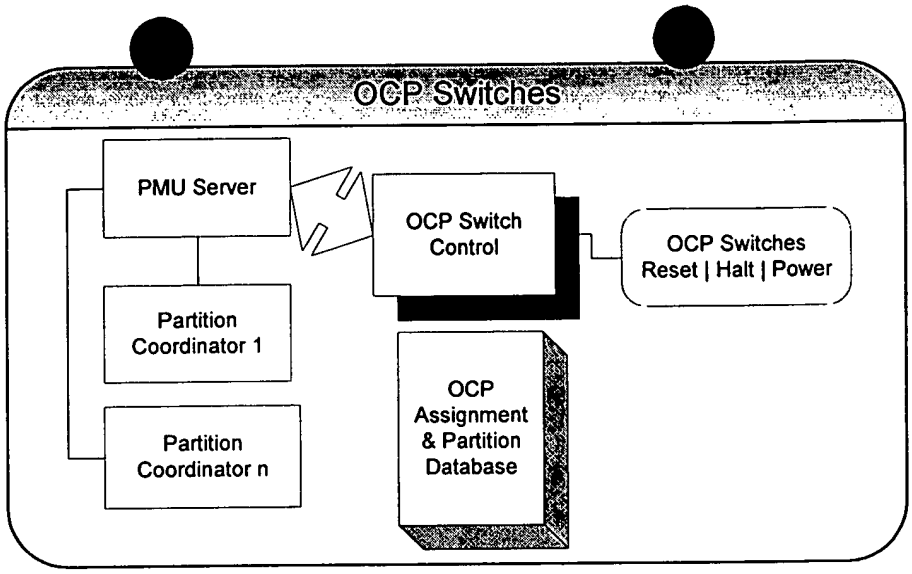
OCP 8P Example

Fig. 75



OCP Button Label Example

Fig. 76



OCP Switches Block Diagram

Fig. 77

Command	Purpose	Process
SET ATTENTION INDICATOR	Light, Extinguish LED at MBM, PBM, CMM or Cabinet	Take action according to the desired state in the request.
SET KNOB	Name/value pair to control some MBM/PBM capabilities	Coded into the Image is a list of variable names that can be modified.
GET KNOB	The value currently maintained for the named variable is returned.	Check to see if the name is in the list and return it's current value in the response.
READ	Allow debug read of physical memory or I/O.	Check on validity of request and if valid, read physical memory space or direct I/O space. For debug.
WRITE	Allow debug write of physical memory or I/O.	Check on validity of request and check MMU protection privileges to write in the space so as not to cause protection violations. If not protected, write the block. For debug.

Miscellaneous Command Handling

Fig. 78

Command	Arg Count	Arguments	Result	Handling
Show_config	0		See Section "Show Configuration with FRU Data"	Make requests to PMU Server
Reset	2	1-Partition No 2-Sub Partition No	Returns OK or error	Send Reset Partition to PMU Server
Power_on	2	1-Partition No 2-Sub Partition No	Returns OK or error	Send Power On Partition to PMU Server
Power_off	2	1-Partition No 2-Sub Partition No	Returns OK or error	Send Power Off Partition to PMU Server
Halt_on	2	1-Partition No 2-Sub Partition No	Returns OK or error	Send Halt on Partition to PMU Server
Halt_off	2	1-Partition No 2-Sub Partition No	Returns OK or error	Send Halt Off Partition to PMU Server
Prepare_EV7_List	2-16	1-MBM Rack-thumb-wheel, 2-Ev7 Id (0-7) up to 8 pairs	OK if all elements are in the same hard partition or free pool	Saves this value in MBM RAM for use with the next Add EV7s, Free Ev7s. Lasts until next Prepare EV7 List.
Add_Ev7s	2	1-Partition No 2-Sub Partition No	Take the values in the Ev7 list and add it to the partition.	Send command to PMU Server.
Free_Ev7s	0		Take the values in the Ev7 list and remove them from the partition indicated.	Send command to PMU Server.
Save_partition	2	1-Partition No 2-Sub Partition No	The partition database gets stored to NVRAM.	Send command to PMU Server.
Destroy_partition	2	1-Partition No 2-Sub Partition No	Reset & Free all Ev7s from partition.	Send command to PMU Server.
Ev7_test	3	1-MBM Rack-thumb-wheel, 2-Ev7 Id (0-7), 3-Test Number	Test Status	Send a Ev7 Start Test request to the CMM.
Add_cable	5-6	1-Source - MBM Rack-thumb-wheel, 2-Ev7 Id (0-7), 3-Port(N,S,E,W), 4-Destination – MBM/PBM Rack-thumb-wheel, 5- Ev7 Id(0-7) or IO7 Id(0-3), 6-Port(N,S,E,W) or blank when IO7	This command assists in locating the proper connector pair to connect the cable. The leds at each connector are lit until the connection is complete.	The commands Set Cable Test Signal State and Get Cable Test Signal State are sent to the appropriate MBM and PBM to cause the leds to light and check the connection itself.
New_cabling	0		Redo cabling tests.	Send Reconfigure Cabling to PMU Server.
Show_cabling	0		Displays a list of IP & IO Cabling	Send Retrieve Cabling Configuration to PMU Server.
Virt_console	3	1-Partition No, 2-Sub Partition No, 3-COM Port(1,2)	Open a session with primary EV7 & intercept COMx Port Data.	Use PutChar streams for both display and keyboard data until the keyboard data sequence 'ESC'ESC'S'M' is recognized as an exit of the session.
Get_fans	1	1-MBM/PBM Rack-thumb-wheel	RPM and threshold that fans are running at.	Determine appropriate IP address for destination and send a Get Fan RPM Speed message.
Set_fan	3	1- MBM/PBM Rack-thumb-wheel, 2-Instance of Fan, 3-RPM	Error or OK	Determine appropriate IP address for destination and send a Set Fan RPM Speed message.
Error_counts	0		Returns a list of the error counts on all MBM/PBM error logs.	Send Error Log Count request to each MBM/PBM.
Error_clear	1	1- MBM/PBM Rack-thumb-wheel	OK	Send Error Log Clear request to destination
Get_errors	1	1-count of the number of errors to be reported on each device.1	A list of the last Error Messages in English as it would appear on the OCP with any qualifying data formatted as appropriate. This is repeated for each MBM and PBM.	Get the ERROR LOG COUNT from each micro. Send Error Log Entry Retrieval Requests to each micro using the highest number as the 1st request.

Fig. 79A

Command	Arg Count	Arguments	Result	Handling
Get_time	0		Date and time is displayed as dd/mm/yy hh:mm:ss	Use Get base Time command
Set_time	1	1-Date and Time entry in format:"dd/mm/yy-hh:mm:ss"	Redisplays date and time	Set Base Time and Announce Base Time Change is sent to all MBMs.
Req_knobs	2-3	1- MBM/PBM Rack-thumb-wheel, 2- Device("MBM", "PBM", "CMM"), 3- If CMM in 2, then number (0-3)	Names and values of all possible knobs are listed.	Request Knob command for all possible knobs for that device.
Set_knob	4-5	1- MBM/PBM Rack-thumb-wheel, 2- Device("MBM", "PBM", "CMM"), 3-If CMM in 2, then number (0-3) 2-Knob name, 3-Knob Value	OK	Set Knob on requested micro.
Firmware_version	3-4	1- MBM/PBM Rack-thumb-wheel, 2- Device("MBM", "PBM", "CMM"), 3-If CMM in 2, then number (0-3) 4-Module ("CMM", "FPGA","SROM", "XSROM","MBM", "PBM","CMM_FSL","MBM_FSL","PBM_FSL","PBM_FPGA")	Returns the version number	Report Firmware Version Command
Firmware_upgrade	4-5	1- MBM/PBM Rack-thumb-wheel, 2- Device("MBM", "PBM", "CMM"), 3-If CMM in 2, then number (0-3) 4-Module ("CMM", "FPGA","SROM", "XSROM","MBM", "PBM","CMM_FSL","MBM_FSL","PBM_FSL","PBM_FPGA") 5-TFTP Server IP Address	Makes the terminal into a PPP serial link making TFTP requests until completion of the transfer or a timeout occurs. Possible return values are: "Complete", "Timeout", "File too long", "File too short"	Send the Upgrade Firmware request to the MBM or PBM or CMM. Make the backup copy where required. MBM has a copy of CMM program.

Fig. 79B

Command	Arg Count	Arguments	Result	Handling
Load_test_version	4-5	1- MBM/PBM Rack-thumb-wheel, 2- Device("MBM", "PBM", "CMM"), 3-If CMM in 2, then number (0-3) 4-Module ("CMM", "FPGA","SROM", "XSROM","MBM ", "PBM","CMM_FSL","MBM_FSL","PBM_FSL","PBM_FPGA") 5-TFTP Server IP Address	Makes the terminal into a PPP serial link making TFTP requests until completion of the transfer or a timeout occurs. Possible return values are: "Complete", "Timeout", "File too long", "File too short"	Send the Load Test Version Command to the MBM or PBM or CMM, which maintains a copy of the program in MBM memory.
Disable_test_version	3-4	1- MBM/PBM Rack-thumb-wheel, 2- Device("MBM", "PBM", "CMM"), 3-If CMM in 2, then number (0-3) 4-Module ("CMM", "FPGA","SROM", "XSROM","MBM ", "PBM","CMM_FSL","MBM_FSL","PBM_FSL","PBM_FPGA")	OK	Send Disable_test_version command

CLI Commands

Fig. 79C

Knob Name	Possible Values	Usage
CLI_PORT_SPEED	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400	Speed between COM Port and Modem (default 57600bps)
CLI_DATA_BITS	8, 7	COM Port UART uses 7 or 8 data bits before stop (default 8)
CLI_STOP_BITS	1, 1.5, 2	COM Port UART sends 1, 1.5 or 2 stop bits to modem (default 1)
CLI_FLOW_CTL	HW, SW, NONE	Flow Control: HW – RTS/CTS signals (default), SW-Xon/Xoff bytes, None
CLI_MODEM	YES, NO	If no modem is connected use no; otherwise the following set of CLI_MDM knobs are required.
CLI_MDM_INIT	AT string for modem initialization	On each hang-up or drop of carrier signal this command is sent to the modem (default is "ATZ"). If modem doesn't respond with OK, 3 retries are attempted.
CLI_MDM_DIAL	AT string when we dial out to drop an alert message or dial-back.	Prefix for dialing the number indicated in the alert number or dial-back number. (default is "ATDT"). If modem responds with OK, communication is considered to be established, else 3 retries are attempted.
CLI_DIAL_BACK	Phone Number with dialing pauses	For security purposes whenever a connection is made, the program will hangup and dial the indicated number to establish connection. (default empty)
CLI_DIAL_ALERT	Phone Number with possible dialing pauses for a receiver of alert messages.	If an error message has an alert indication, the text portion that would be formatted for the OCP is sent after establishing a modem connection with the indicated number. Note: There is no paging support TAPI, Alphanumeric or Numeric implied by this option.
CLI_PASSWORD	The only password that is allowed to at time of connection. A password prompt is used.	The password prompt appears on a modem connection requesting the password entry to continue. The entry must match the null terminated string belonging to this knob. If not, a hang-up command is sent to the modem. A default password will exist <TBD>, if none has been assigned.

Modem Knobs

Fig. 80

Capability	Ramification during MBM failure
Proxy Forwarding	LAN messages to the CMM fail.
CMM presence watchdog	There is no notification of failure
TFTP Server	CMM is unable to be firmware upgraded
Error repository & distribution	CMM is unable to log errors
Power hierarchy	Partition power changes cannot occur
Time Services	CMM does not receive regular time updates
Virtual Console Terminal	Console input/output unavailable if primary in path
SRM Env. Var. Repository	Env. Writes fail; SRM write callbacks fail.

MODEM KNOBS FOR CONNECTION TO CLI PORT

Fig. 81

Command	OS / SRM Up	All EV7s	Maj. Grp.	Comment
Distribute Partition Database with EV7 change, Add EV7, Delete EV7	T	T	T	Provided the new EV7 is still in the majority group and routable.
Set Partition Delta Time, Store Environment Variables, Assign Sub partitions, Assign Memory & IO7	X	X	T	This affects the database; but when joined back again majority wins.
Reset, Halt, Quiesce, Continue	T	T	X	This doesn't affect the non-volatile database.
Power On, Power Off, Change Primary	X	X	X	Never allowed on a split partition

Operation Limitations in a degraded system

Fig. 82

Operations	Structures	Distribution Commands	RAM	NVR
The LAN Group protocol messages use either broadcast or request/response messages in forming a group.	GroupId(RAM), MajGID(RAM), Micro-procesorSet(NVRAM)	NewGroup, Accept, Join, SetMembership	x	x
The Group Leader, after forming a new group, checks the copy of all members' partition databases and distributes the copy. EV7 changes noted by the PMU Server are distributed via a partition database change. The partition coordinator, when reconfiguring the partition, may need to distribute commands that change the volatile copy of the partition database.	EV7/IO7, memory locations, assignments and status.	Request partition database, Distribute partition database	x	x
The PMU Server initialization includes the cable testing and distribution of that volatile database information	Cable Configuration	Retrieve Cabling Configuration	X(not distribu ted)	
The DHCP Server distributes the list of DHCP leases and their changes.	DHCP Leases	Distribute DHCP Lease Data	x	x
The Partition Coordinator distributes to all members any changes in the status of the partition's state and attributes to allow fail-over recovery to another partition coordinator. Changes to Memory, IO7 and Community assignments among the sub-partitions. Partition states are affected by the ongoing starting, routing, loading, halting, resetting and power controls on the entire partition. Attribute fields on a partition are: 1) OS Watchdog Interval and Action Mask, 2) BB_Watch Delta Time, 3) SRM Environment Variables.	Partition State and attribute fields(RAM). The state and OS Watchdog is kept in volatile RAM and all other attributes are stored in NVRAM location for that partition.	Set Partition State and attributes or Distribute One Partition's Database	x	x
MBM maintains in RAM status on it's own CMMs, EV7s and memory. I2C data, error log count, Knobs and OCP data is maintained in RAM.	CMM EV7 Status, I2C sensor and EEROM values, volatile Knobs.	MBM Report Configuration	X(not distibut ed)	
MBM maintains the current use of the OCP switch settings and some Knobs. Default is entire system enclosure.	OCP switch control, permanent Knobs.	OCP to Partition Assignment	X(not distribu ted)	X(not distribu ted)
PBM maintains a RAM copy of it's own IO7 Ids, I2C data and error log count.	IO7 riser Ids, I2C sensor and EEROM values.	PBM Report Configuration, Receive Cable ID	X(not distribu ted)	
PBM receives from SRM the PCI Configuration Data and retrieves it on request. MBM, PBM and CMM knob data are kept in NVRAM to tailor behavior.	PCI Config Space(RAM), Knob Data.	Store PCI Slot Info, Read PCI Slot Info, Set Knob Data, Get Knob Data	X(not distribu ted)	X(not distribu ted)

Data Base Grouping

Fig. 83

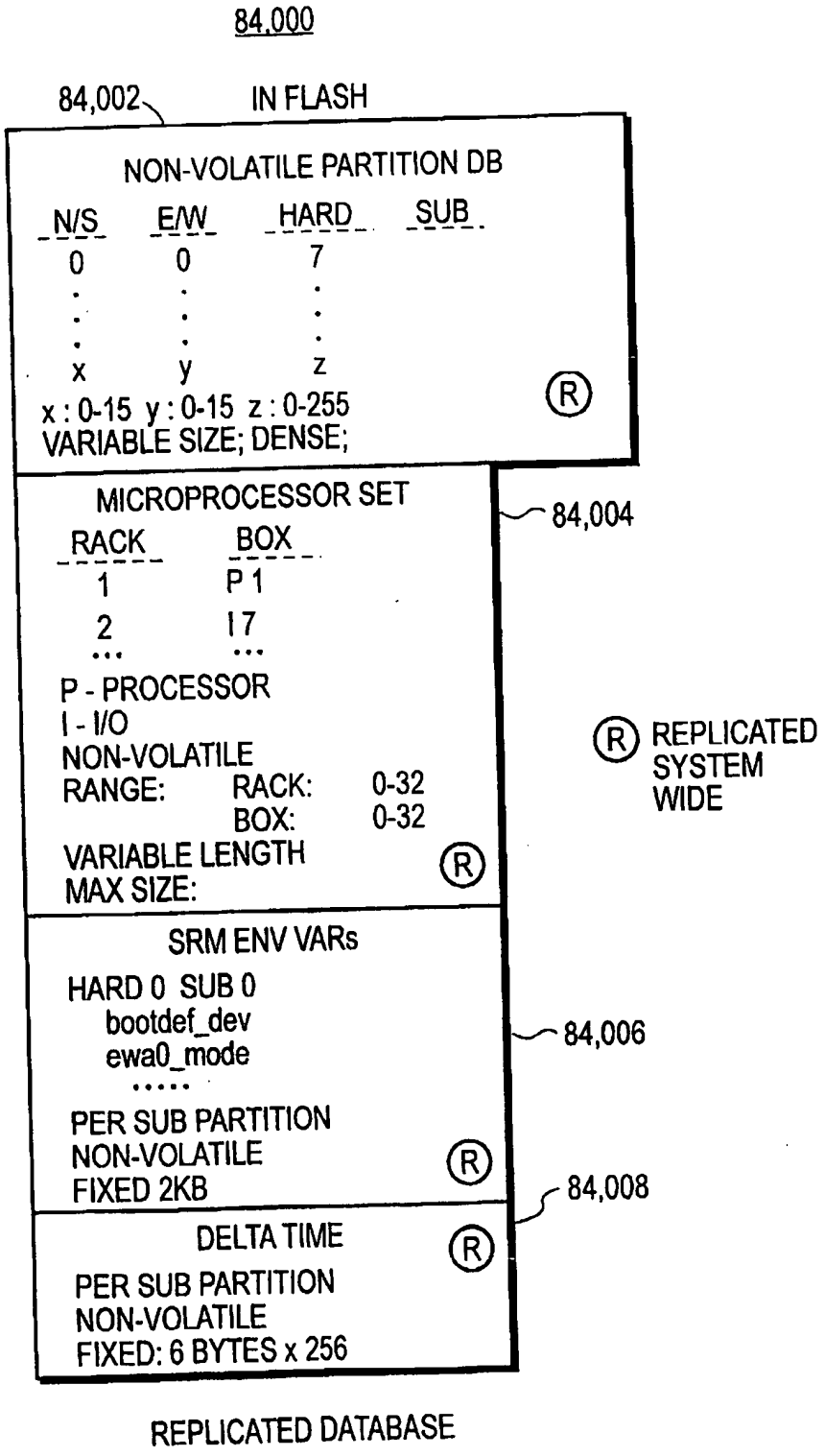

84,000
84,002
IN FLASH
NON-VOLATILE PARTITION DB
N/S
E/W
HARD
SUB
0
0
7
x
y
z
x : 0-15 y : 0-15 z : 0-255
VARIABLE SIZE; DENSE;
R
MICROPROCESSOR SET
RACK
BOX
1
P 1
2
I 7
P - PROCESSOR
I - I/O
NON-VOLATILE
RANGE: RACK: 0-32
BOX: 0-32
VARIABLE LENGTH
MAX SIZE:
84,004
R REPLICATED SYSTEM WIDE
SRM ENV VARs
HARD 0 SUB 0
bootdef_dev
ewa0_mode
PER SUB PARTITION
NON-VOLATILE
FIXED 2KB
84,006
84,008
DELTA TIME
PER SUB PARTITION
NON-VOLATILE
FIXED: 6 BYTES x 256
REPLICATED DATABASE

FIG. 84A

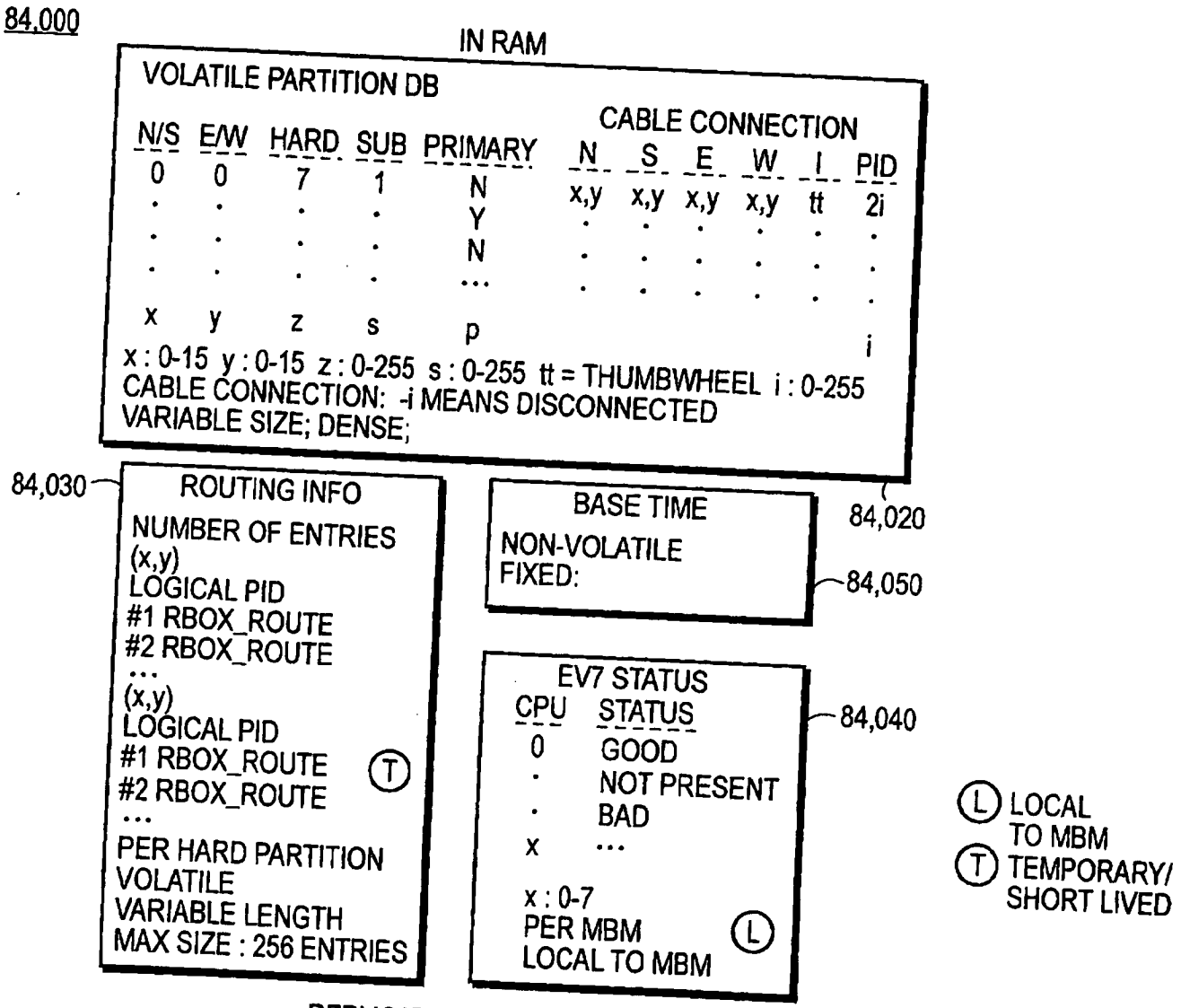


FIG. 84B

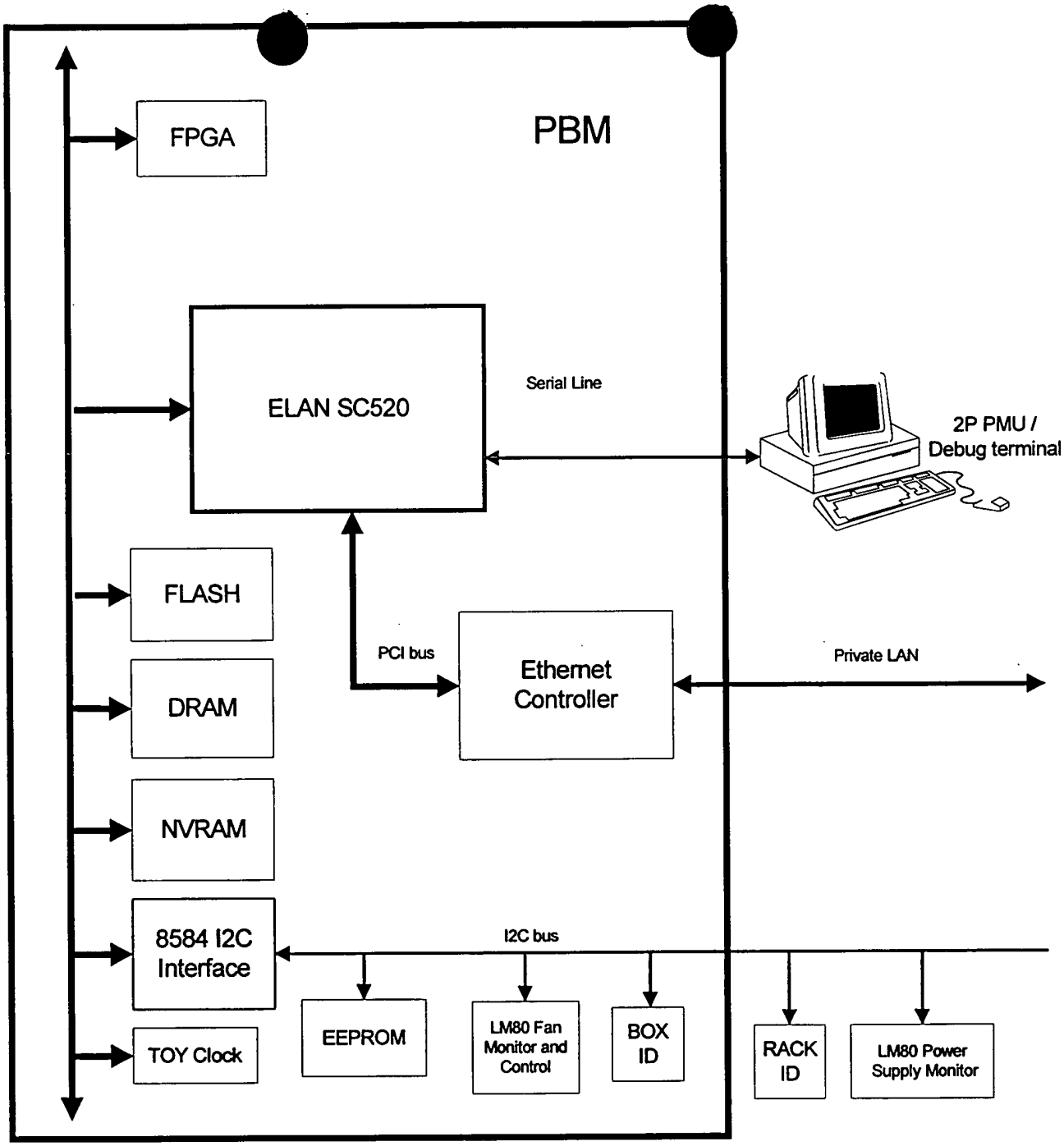
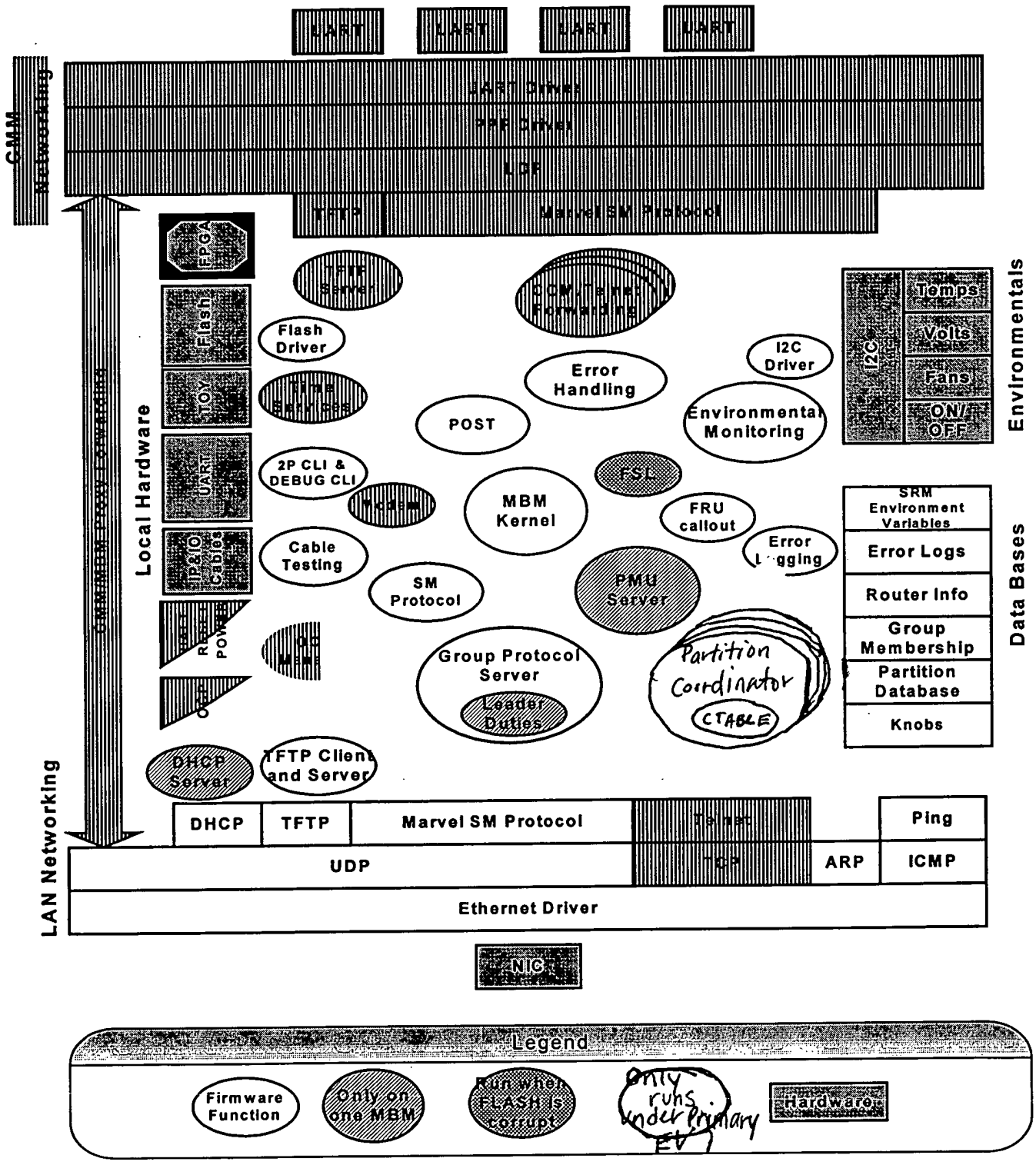

PBM
FPGA
ELAN SC520
Serial Line
2P PMU /
Debug terminal
FLASH
DRAM
NVRAM
8584 I2C
Interface
TOY Clock
PCI bus
Ethernet
Controller
Private LAN
I2C bus
EEPROM
LM80 Fan
Monitor and
Control
BOX
ID
RACK
ID
LM80 Power
Supply Monitor

Fig. 85

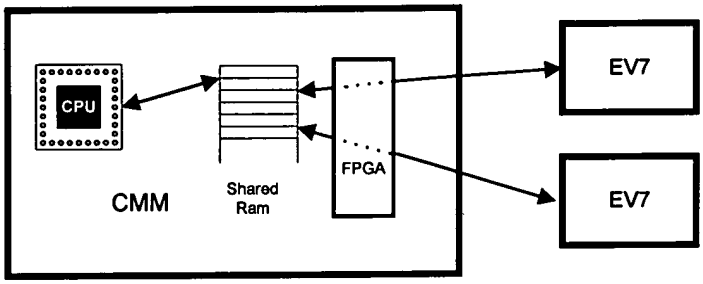


PBM Hardware Overview

Fig. 86

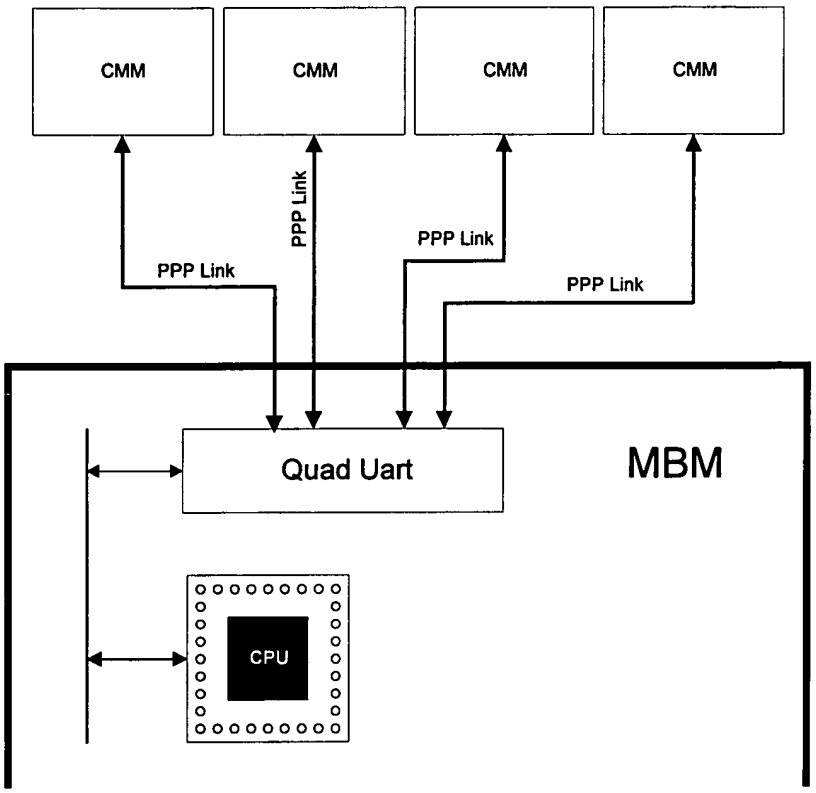
Error Code	Device Type	Reporter	OCP/CLI Text	Log	Alert	Sysevent	EEROM	EcoData	OCP
1	none	Anyone	Free Text	x	?	?		x	?
2	none	Anyone	Binary with no text	x	?	?		x	?
1	EV7	CMM	EV7 xx Failure Code xx on running OS	x	x	x		x	x
2	EV7	CMM	EV7 xx Failure in Routing to EV7 xx	x	X				
3	EV7	CMM	EV7 xx Power On Failed	x	x				x
4	EV7	CMM	EV7 xx Failed on Test xx with Status xx	x	x				
5	EV7	CMM	EV7 xx Overheated at xxx Fahr.	x	x	x			x
6	EV7	CMM	EV7 xx xx.x Power at xx.x	x	x	x			x
7	RIMM	CMM	Memory Test xx Failure for RIMM xx	x	x			x	x
8	FPGA	CMM	CMM x FPGA Failure xx	x	x				x
9	CMM	CMM	CMM x POST Error xx	x	x			x	x
10	CMM	CMM	CMM x Failsafe Load Required	x	x		X		x
11	CMM	CMM	CMM x Failed to Start Test xx	x	x		X	x	x
12	I2C	CMM, MBM	I2C Failure on MBM xx CMM x	x	x	x			x
13	MBM	MBM	MBM Post Failure xx	x	x			x	x
14	Power Supply	MBM	Power Supply x can't power on	x	x	x			x
15	LAN	MBM	No Peer Communication on LAN	x		x			x
16	UART	MBM	COM Port x Failure	x	x				x
17	MBM/PBM	MBM/PBM	Fail Safe Load Required	x	x				x
18	LAN	MBM/PBM	In Isolated Group on LAN	x	x	x			x
19	Memory	MBM/PBM	Single/Multi bit Ecc Error	x	x			x	x
20	WDT	MBM/PBM	MBM Watchdog Reset	x	x	x			x
21	WDT	MBM	Watchdog Expired on Partition xx	x	x	x			x
22	IO7	PBM	IO7 xx Drawer not accessible	x	x	x			x
23	Temp	MBM/PBM	Temperature too high xxx Fahr	x	x	x	X		x
24	EEROM	CMM, MBM/PBM	EEROM xx not accessible	x	x				x
25	OCP	MBM	OCP not accessible	x	x				
26	IO7	MBM	EV7 xx not connected to IO7 xx	x		x			x
27	EV7	MBM	Virtual Console at EV7 xx busy	x					x

Error Codes- Fig. 87



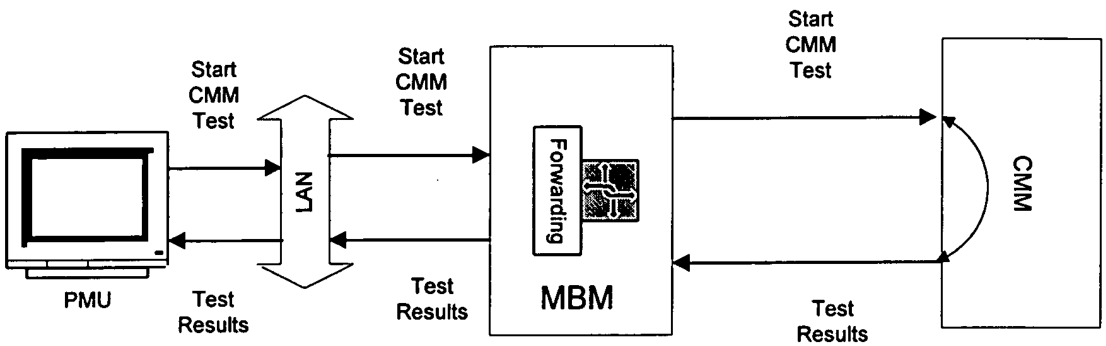
Shared Ram Communiaction

Fig. 88



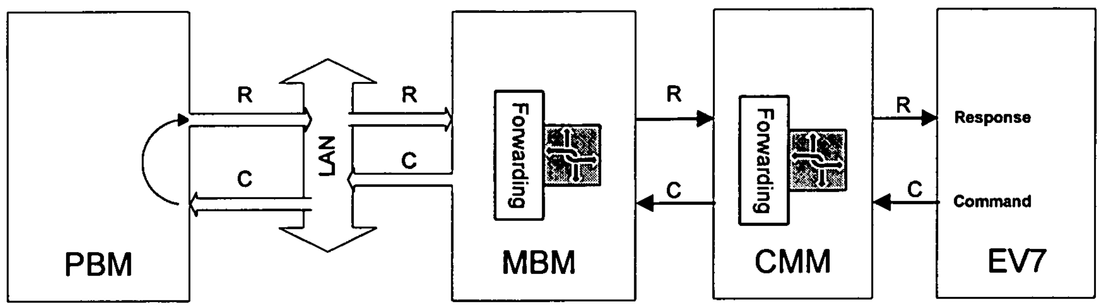
MBM to CMM communication

Fig. 89



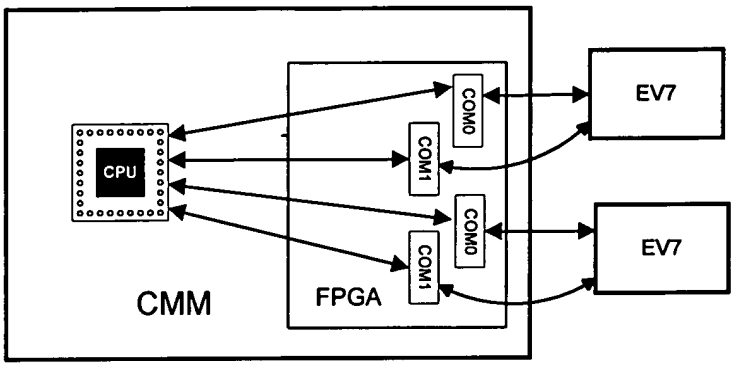
Example of MBM forwarding

Fig. 90



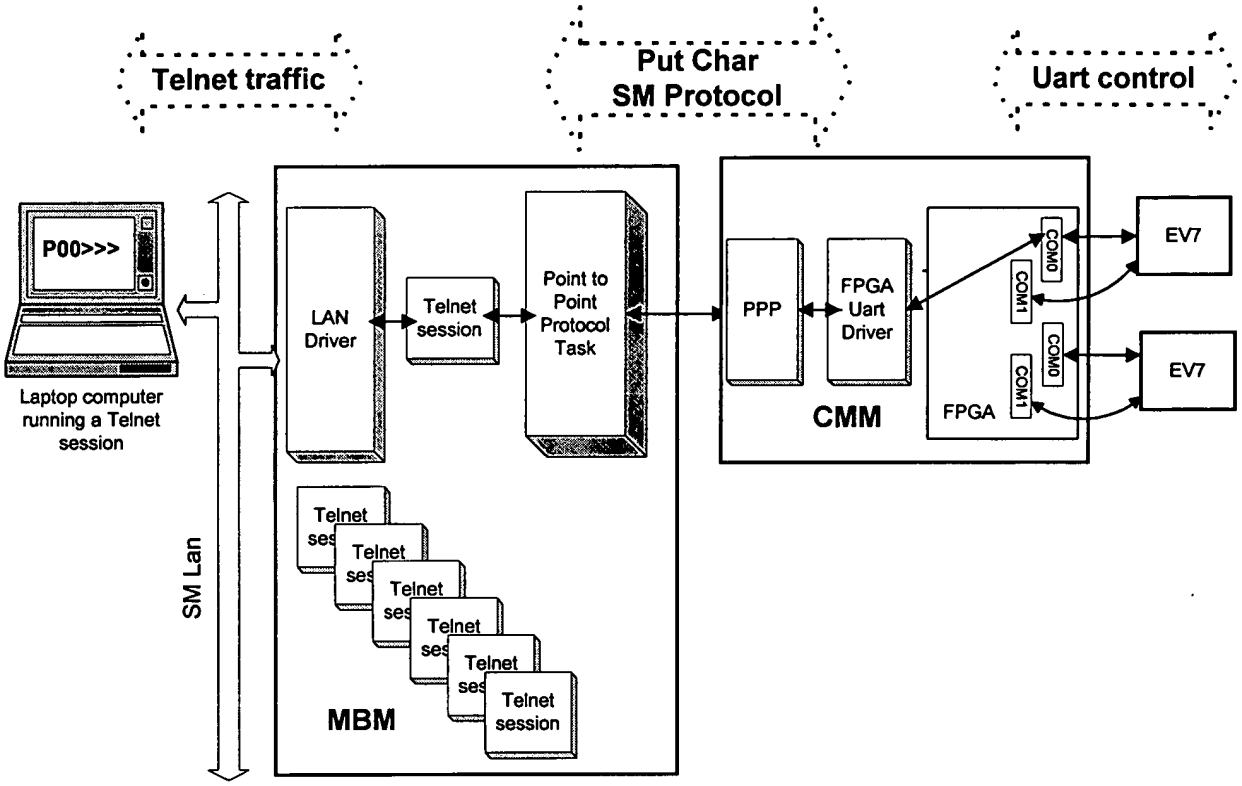
Example of CMM forwarding

Fig. 91



CMM com port connection

Fig. 92



The Telnet Session

Fig. 93

REQUEST FORMAT

Size (dec)	Start (hex)	End (hex)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4	0	3	Originator IP address							
4	4	7	Destination IP address							
4	8	B	Identifier							
2	C	D	Command Code							
n	E	n+E	Data (optional)							

Request Format

Fig. 94

RESPONSE FORMAT

Size (dec)	Start (hex)	End (hex)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4	0	3	Originator IP address							
4	4	7	Destination IP address							
4	8	B	Identifier							
2	C	D	Response Code							
2	E	F	Status (See App. A)							
n	10	n+10	Data (optional)							

Response Format

Fig. 95

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Originator IP address (0)							
Destination IP address (FFFFFFFFh)							
Identifier (GroupID)							
Command Code							
SM LAN message							

Train Message Header Format

Fig. 96

Command Descriptor	Code
New group	0101h
Accept group offer	0102h
Reject group offer	0103h
Join group	0104h
Probe microprocessor	0105h
I-am-alive	0106h
Report Conflicting Address	0107h
Set Membership Configuration	0108h

LAN Formation Group

Fig. 97

Command Descriptor	Code
Full Train Message	0201h
Empty Train Message	0202h

Reliable Message Group

Fig. 98

Command Descriptor	Code
Get CMM State	0310h
Get MBM Configuration	0321h
Get PBM Configuration	0322h
Get Partition Database	0323h
Distribute Partition Database	0324h
Get System Topology	0330h
Store PCI Slot Info	0331h
Get PCI Slot Info	0332h
Get Own Partition Number	0333h

System Discovery Group

Fig. 99

Command Descriptor	Code
Create Partition	0401h
Set Partition Attributes	0402h
Move EV7s to Partition	0403h
Remove EV7s from Partition	0404h
Save Partition Assignment	0405h
Start Partition	0406h
Reset Partition	0407h
Power On Partition	0408h
Power Off Partition	0409h
Halt Partition	040Ah
Add EV7s to Running Partition	040Bh
Delete EV7s from Running Partition	040Ch
Switch Primary EV7	040Dh
Destroy Partition	040Eh
Continue Partition	040Fh
Compute Routing	0410h
Configure RBOX/CBOX	0411h
Set Partition State	0412h
Get State of OCP switches	0413h
OCP Switch Assignment	0414h
Power On/Off	0415h
System Event	0416h
Assign Sub Partitions to Community	0417h[1]
Get Hard Partition Memory Assignments	0418h
Assign Memory Block to Sub Partition	0419h
Assign IO7 to Sub Partition	041Ah
Store Environment Variables	041Bh
Get Environment Variables	041Ch

Partition Control Group

Fig. 100

[1] Communities are to be implemented at a later phase of development.

Command Descriptor	Code
EV7 Reset On/Off	0501h
EV7 Pulsed Reset	0502h
EV7 Halt On/Of	0503h
EV7 Quiesce	0504h
EV7 RBOX/CBOX Config	0505h
Request EV7 Start Test	0506h
Load Image	0507h
Load & Run SRM	0508h

EV7 Setup Group

Fig. 101

Command Descriptor	Code
Set Cable Test Signal State	0601h
Get Cable Test Signal State	0602h
Send Cable ID	0603h
Receive Cable ID	0604h
Get MBM IP Cabling	0605h
Get PBM IO Cabling	0606h
Get Cabling Configuration	0607h
Reconfigure Cabling	0608h

Cable Test Group

Fig. 102

Command Descriptor	Code
Get Telnet IP Address/Port	0701h
Put Chars from Keyboard to Virtual Cons	0702h

Virtual Console Group

Fig. 103

Command Descriptor	Code
Get Firmware Version	0801h
Upgrade Firmware	0802h
Load Test Version	0803h
Disable Test Version	0804h

Firmware Load and Upgrade Group

Fig. 104

Command Descriptor	Code
Get Voltage Readings	0901h
Get Temperature Readings	0902h
Get Fan RPM Readings	0903h
Set Fan RPM Speed	0904h
Set OCP Display Data	0905h
Set Attention Indicator	0906h
Get Switch State	0907h
Get Power Supply State	0908h

Environmental Retrieval Group

Fig. 105

Command Descriptor	Code
Get EEROM Data	0A01h
Set EEROM Data	0A02h

FRU Data Group

Fig. 106

Command Descriptor	Code
Error Reporting	0B01h
Get Error Log Count	0B02h
Error Log Clear	0B03h
Get Error Log Entry	0B04h

Error Logging Group

Fig. 107

Command Descriptor	Code
Start OS Watch Dog	0C01h
Keep Alive	0C02h
Stop OS Watchdog	0C03h

OS Watch Dog Timer

Fig. 108

Command Descriptor	Code
Get Base Time	0D01h
Set Base Time	0D02h
Distribute Base Time change	0D03h
Set Partition Delta Time	0D04h
Get Partition Delta Time	0D05h

Date/Time Group

Fig. 109

Command Descriptor	Code
Get Knob	0E01h
Set Knob	0E02h
Unrecognized Response	0E03h
Distribute DHCP Lease Data	0E04h
Read	0E05h
Write	0E06h

Miscellaneous Group

Fig. 110